Notebook, Volume 11

This volume covers the period January-June 1877. The notes and drawings are by Edison, Charles Batchelor, James Adams, and John Kruesi. Most of the material relates to the speaking telegraph. There are also a few pages devoted to acoustic, multiplex, and printing telegraphy. A cover which was apparently used to bind Volume 11 together is still extant and is labeled "Old Sketches Vol 11 January to July 1877 Pages 203." The volume consists of 203 numbered, unbound leaves.

Missing pages, found in facsimile in the Telephone Interferences: 5-6, 8-10, 14-23, 25-32, 37, 39-44, 46, 48-49, 51 1/4, 51 1/2, 56, 58, 60-62, 65, 71, 76, 78, 82, 86-87, 95, 99-102, 106, 111-116, 120-121, 123, 130, 132, 134-137, 139-169, 172-173, 175-187, 189, 191-192, 195-201.

Old sketch

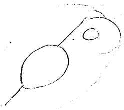
Vol 11

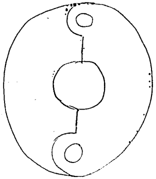
January to July 1877

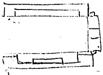
Pages 203.

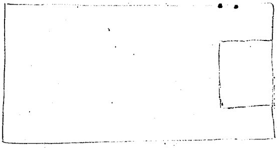
E173-203

Jany 6 1877
TA Edison
James Adams









January 10. 1877.
Strong Solution Caustic
Soda in Porous pot
with 3 or 4 Table
spoonfuls of Creosote.
SO_3 outside Closing
8½ = Shaking
Carbon goes down
added little Gallic
Acid = goes down
to 6½ = added
Carbolic no change
added Chl. Am. goes to
10. 1 min 9½

2

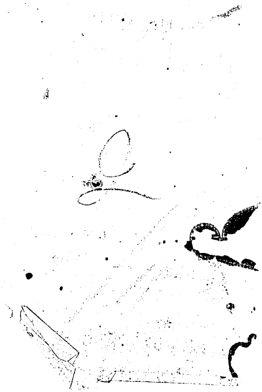
January 10. 1877.
1½ bottle = Porous cell
2 Sticks Caustic Potash
+ 3 or 4 Tablespoonfuls
Creosote, ~~etc~~ Sal am
outside = closing
10 goes to 13 in 4 minutes
by shaking Carbon
strongly dont go up but
1 deg showing small
polarization when its
gets to 13½ shaking
Carbon does not
Effect it showing
perhaps no polarization
phenomena stands [illegible] [illegible]

3

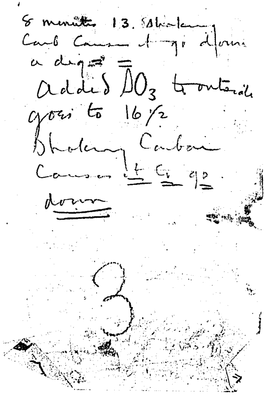
Very Strong
Solution of
Ammonium Chloride
in Porous pot with
Excess of Crystals
& Considerable
Ditto outside.
55, on Closing
3 min 53,

With Wad of [illegible] in Carbon
in porous cell & rubbed amalgam in it
45 | = Rubbed 40

4



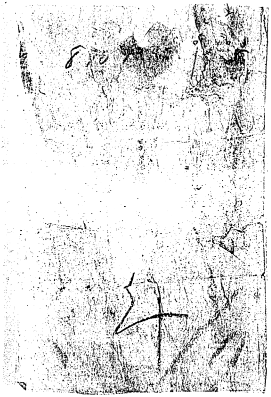
2



8 minutes 13. Shaking
Carb causes it to go down
a degree =
added $\bar{D}O_3$ to outside
goes to 16 1/2
Shaking Carbon
Causes it to go
down

3

3

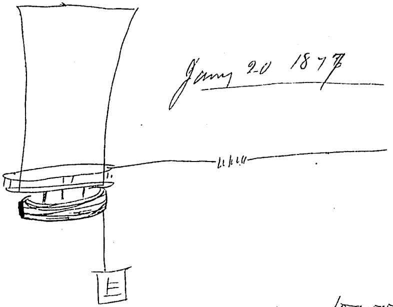


4

EDISON'S EXHIBIT. 5-11.

Speaking telegraph

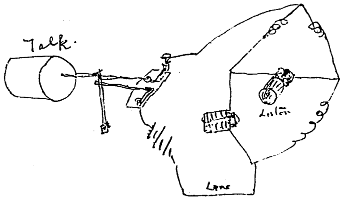
6



Jany 20 1877

Three Platina Points dont seem to work any Better than one Point yet it very good for a western union relay through my teeth. but I think that I could get it better if I had an adjustment to it for Charley cant Hold it steady Enough

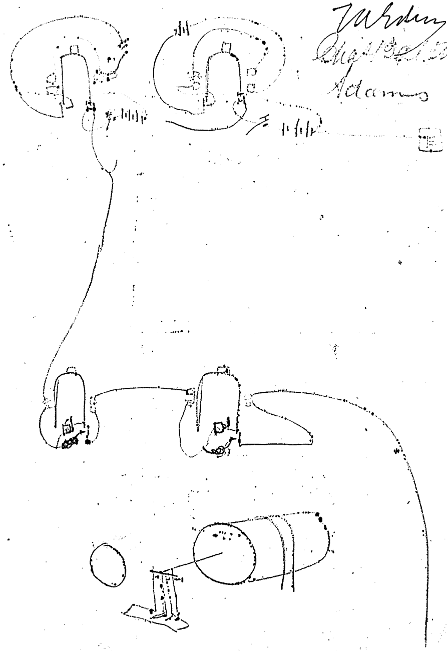
EDISON'S EXHIBIT. 6–11.


Talk.
Listen
Line

Feby 6/1877
TA Edison

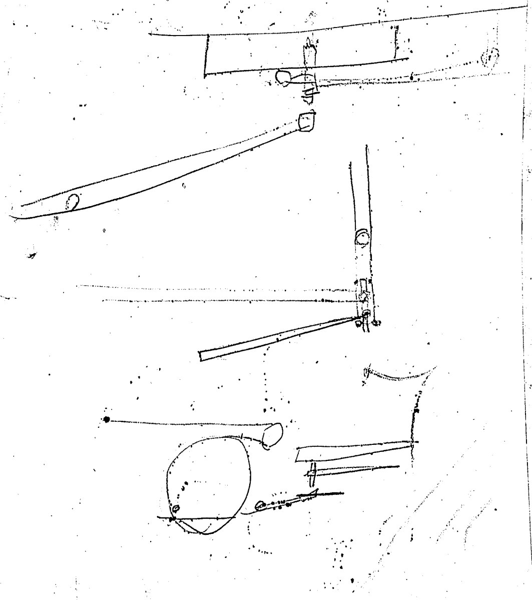
Chas Batchelor
James Adams

[illegible] Feb 6/77



T A Edison
Chas Batchelor
Adams

7



7

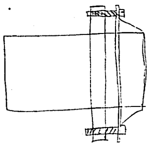
EDISON'S EXHIBIT. 8-11.

Time

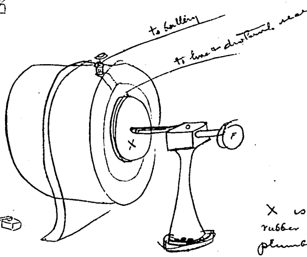
Kruse — Batchelor — Feb. 11

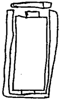
— — 3 — " 12

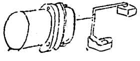
14 — 4 — " 13



Adams







The edg the disk is blackleaded & wire wound around it

X is a Disk of hard rubber coated over with plumbago on the parchment is a piece of tin foil facing the disk on speaking this foil connects with the plumbago & closes cct if low notes a greater surface connects & resistance is thereby reduced if high notes but little contact & current weak

Feb 9 1877

Chas Batchelor

T A Edison

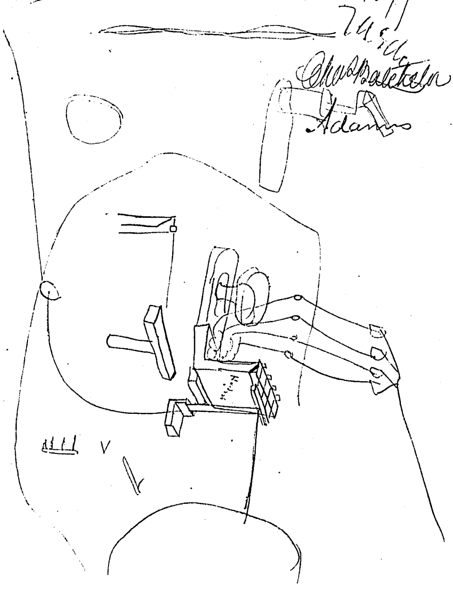
EDISON'S EXHIBIT. 9—11

Spkg Telegraph Feby 11 1877

T A Edison

Chas Batchelor

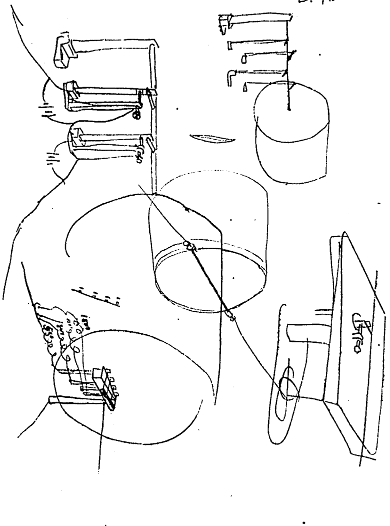
Adams



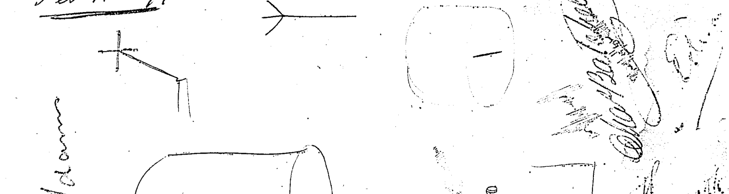
EDISON'S EXHIBIT. 10—11

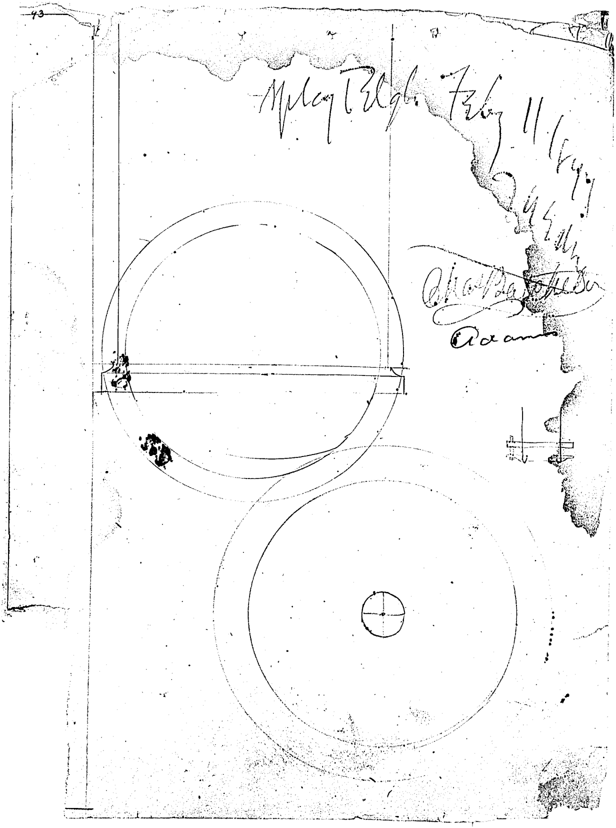
Sexplex Telegph

Feby 11 1877
T A Edison
Chas Batchelor
Adams



Feb 11th 1877


Adams
Chas Batchelor
This with
angle piece
This

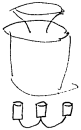


Mplex Telgh Feby 11 1877

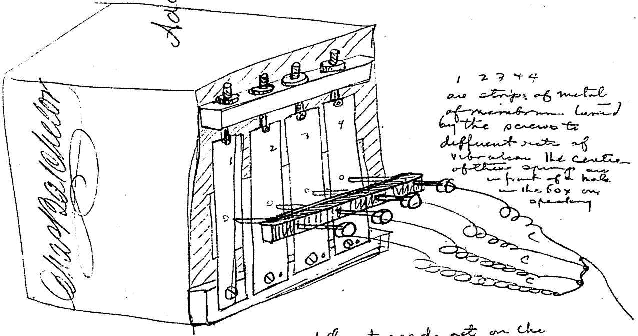
Chas Batchelor

Adams

Fig 14, 177



EDISON'S EXHIBIT. 14—11

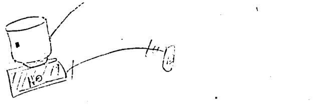


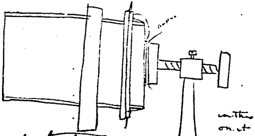
1 2 3 4
are strips of metal
of membrane tuned
by the screws to
different rates of
vibration the centre
of these springs are
in front of the holes
in the box on
speaking

different reeds act on the
central points & give the
vibration & strength of cur. &
by and of the resistances C. C

Feby 19 1877

EDISON'S EXHIBIT. 15—11

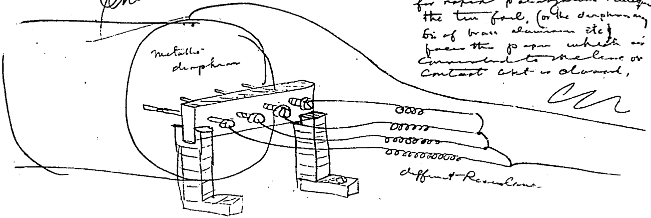




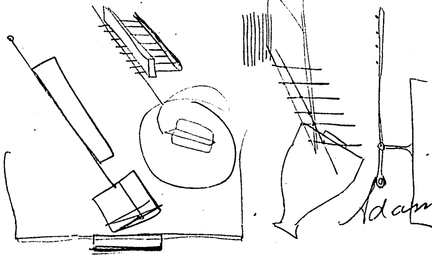
Feby 17 1877

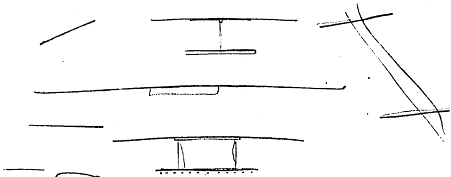
Chas Batchelor

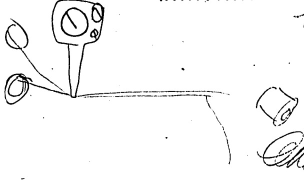
in this Case the disk is of metal & on it is a piece of moistened paper moistened with a Chemical Solution suitable for rapid polarization & deliquescent the tin foil, (or the diaphragm may be of brass aluminum etc) faces the paper which is connected to the line or Contact and is closed,


metallic diaphragm
different Resistance

EDISON'S EXHIBIT. 16–11



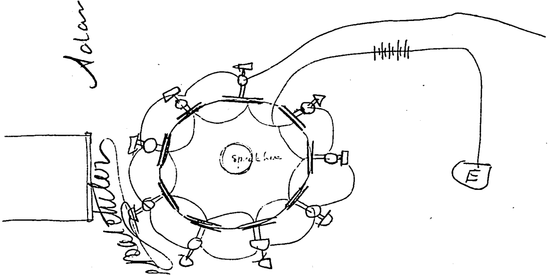




Spl Tel
Feb 19 1877
T A Edi
Chas Batchelor

EDISON'S EXHIBIT. 17-11.

Adams



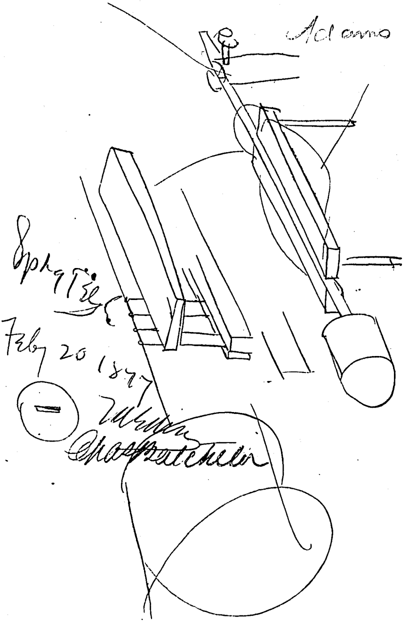
Batchelor

a condenser which charges & discharges by the voice (1c) by bringing the metallized diaphragms together (1c) close a battery charge rushes in & when the go away it discharges these currents acting on Electromagnet on the same set its diaphragm vibrating in unison

Feby 19 1877

T A Edison

EDISON'S EXHIBIT. 18—11



Spkg Tel

Feby 20 1877

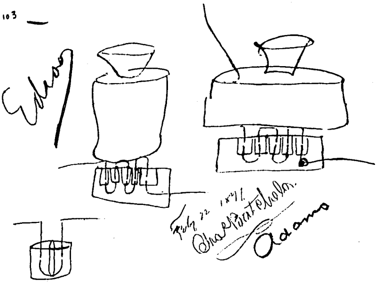
TA Edison

Chas Batchelor

EDISON'S EXHIBIT. 19—11.

103

Edison



Feby 22 1877

Chas Batchelor

Adams

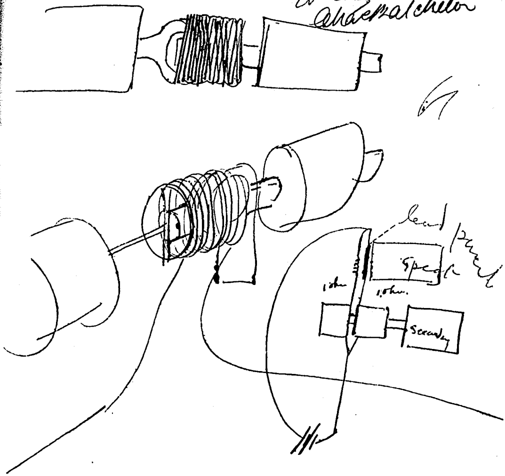
EDISON'S EXHIBIT. 20-11.

Speaking Telegh

March 20/77

Edison

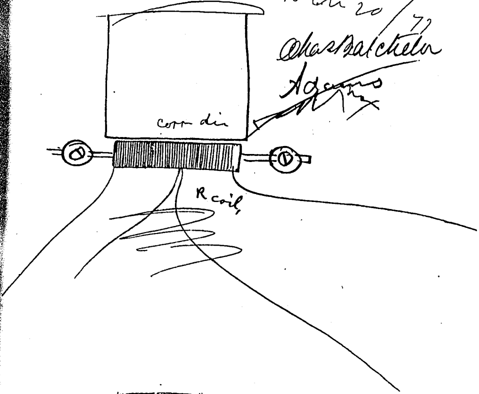
Chas Batchelor



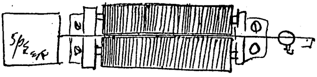
lead pencil
Speaker
1 ohm
1 ohm.
Secondary

EDISON'S EXHIBIT. 21-11.

Spkg Telegh
Mch 20/77
Chas Batchelor
Adams



corr din
R coil



R coil.

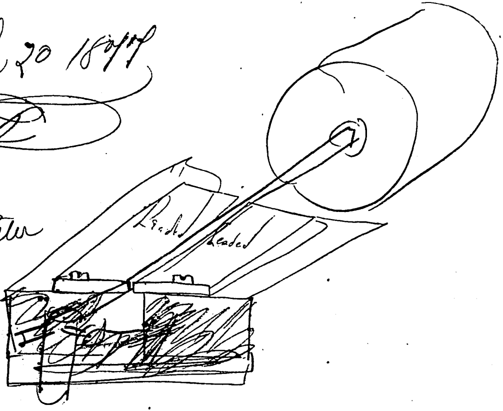
Rubber Cylinder wound with
bare G Silver wire & Vibrating Diaph

March 20 1877

Edison

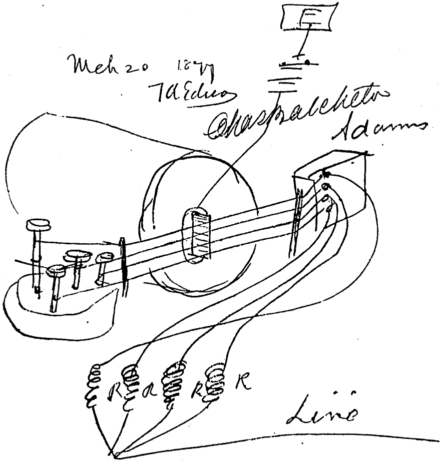
Chas Batchelor

Adams

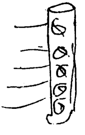

Leaded
Leaded

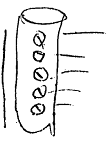
EDISON'S EXHIBIT. 22-11.

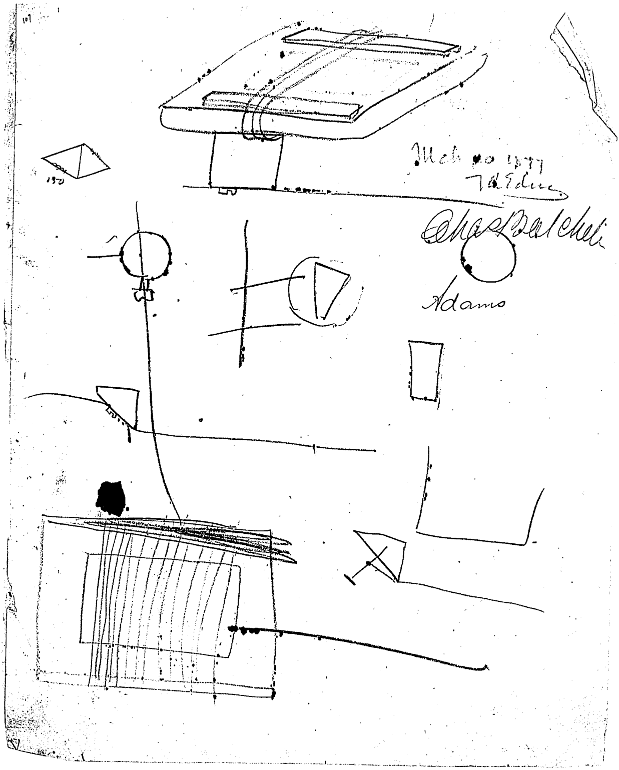
EDISON'S EXHIBIT. 23—11.



Mch 20 1877
T A Edison
Chas Batchelor
Adams







Mch 20 1877
TAEdison

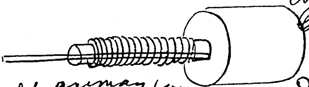
Chas Batchelor

Adams

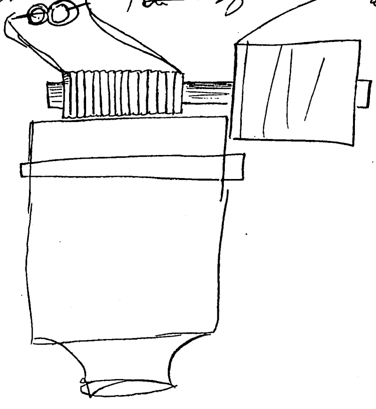
EDISON'S EXHIBIT. 25–11.

Speaking Telegraph
Mch 20 1877

Edison
Chas Batchelor
Adams



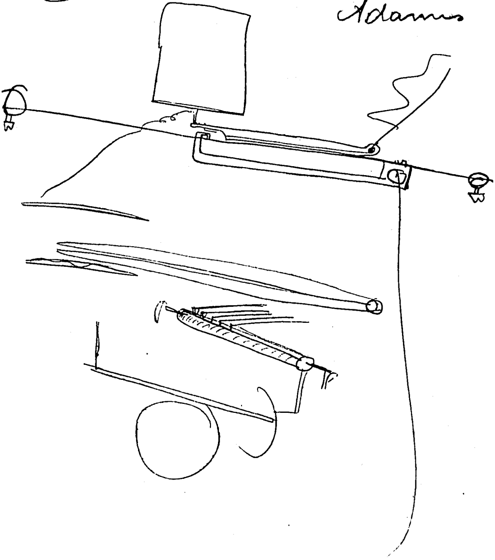
Short ckt primary turns of induction Coil



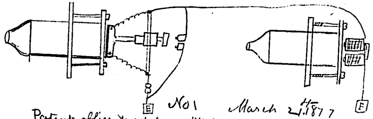
EDISON'S EXHIBIT. 26—11.

Speaking Telegraph
March 20 1877.
Chas Batchelor

Adams



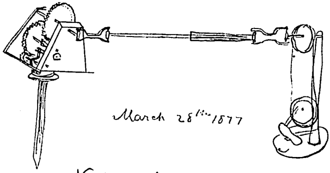
EDISON'S EXHIBIT. 27–11.



No 1 March 24th 1877

Patent office model $10.00

Adams



March 28th 1877

N2 Model $1700

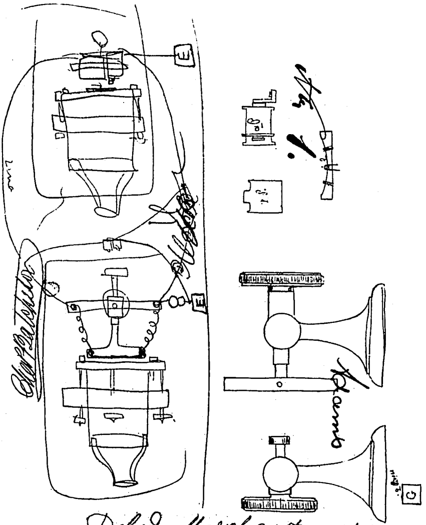
Adams

10 —
17
18
15
12
16
2
2
2
2
2 75
12
116 75
9 00
119 75
4
123.75

mp
Telephone Expences

Sept 4th	Sheet cork -- Kruesi	39¢
" "	Bill Paid for castings "	2 13

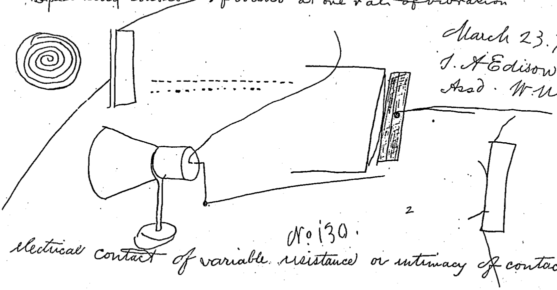
EDISON'S EXHIBIT. 28-11.


Line
E
E
Fig 1
Fig 2
G

Delvd March 21st. 1877

This is a duplicate of the order
and sketch furnished to L. W. Serrell
(when case 130 was ordered.)

Speaking consists of sound at one rate of vibration

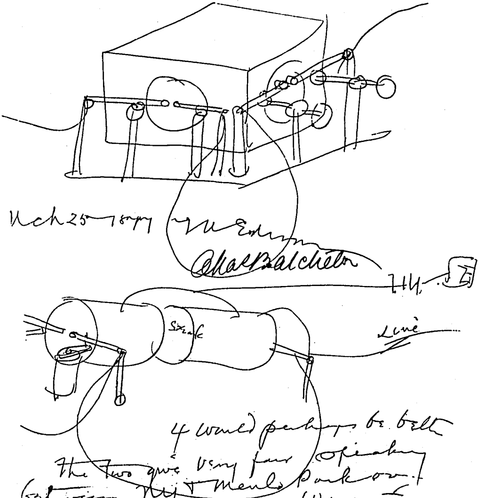


March 23.77
T. A Edison
Asd. W.U.

No. 130.

electrical contact of variable resistance or intimacy of contact

EDISON'S EXHIBIT. 29—11.



Mch 25 1879 T A Edison

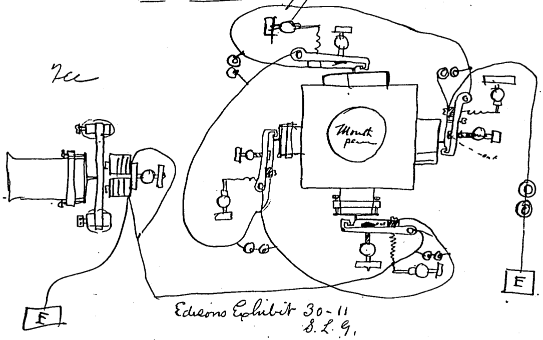
Chas Batchelor

4 would perhaps be better

The two gave very fair speaking between NY & Menlo Park over No 8 soft iron wire

EDISON'S EXHIBIT. 30-11.

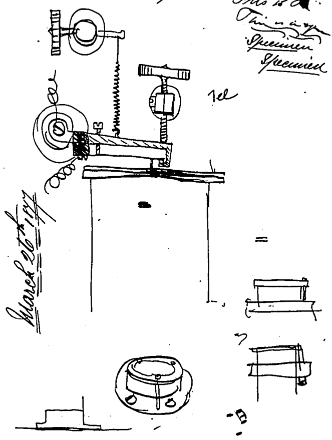
March 26th 1877


Tel
Mouth piece
E
E

Edisons Exhibit 30-11
S.L.G.

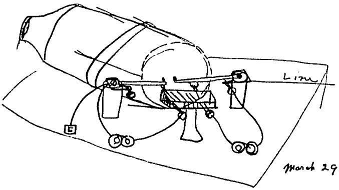
EDISON'S EXHIBIT. 31—11.

This is a This is a specimen
Specimen This is a
Specime This is a
This is a spe
Specimen
Specimen



March 26th 1877

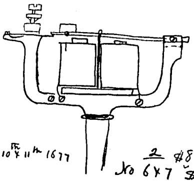
EDISON'S EXHIBIT. 32-11.



March 29th 1877

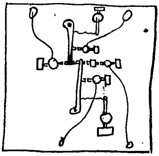
No 5 Model $12 00

Adams



Delivered Apr 10th & 11th 1877

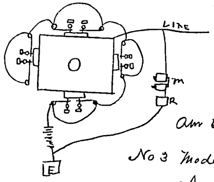
2 $8 00/100 Each
No 6 & 7 " ~~$8 00~~



Adams

No 8 $12 0/100
Apr 12th 1877
Adams

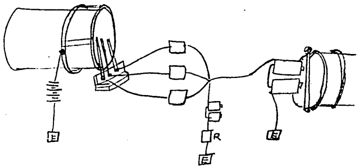
EDISON'S EXHIBIT. 32—11.



Am 6th. 1877

No 3 Model #1800

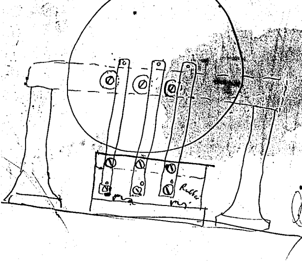
Adams



No 4 Model #1500

Adams

Adams



Chas Batchelor Mch 29/ 1877

1

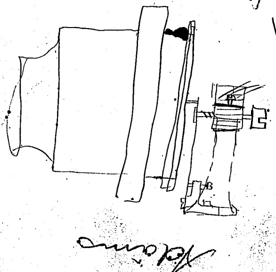
Model Apkg Tel

33

5 ~~page~~ 2.

Mch 29/77

Model Apkg Tel

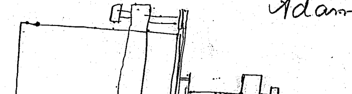


5

Adams

34

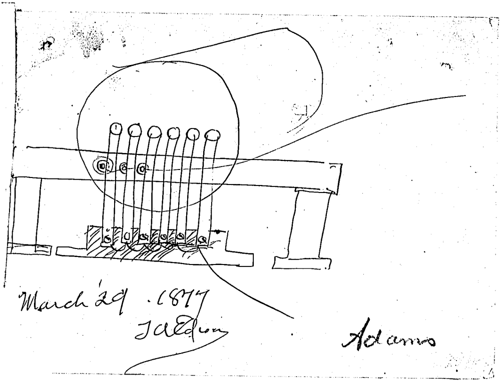
Adams



Apkg Telgh Mch 29 1877

Tel

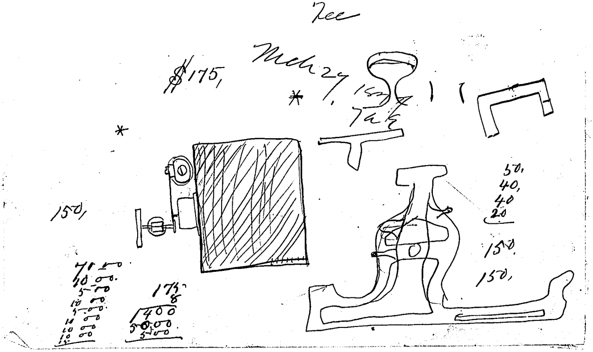
35



March 29 . 1877
TA Edison

Adams

36



Tee

$175,

Mch 29 1877

Tak

*

*

150,

50,
40,
40
20

150,

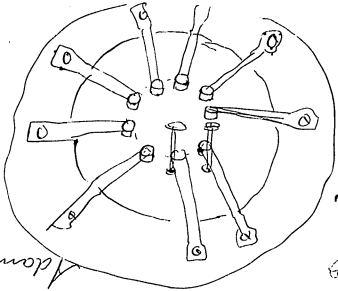
150,

71 00
10 00.
5 00
10 00
5 00.
10 00
10 00
10 00
15

175
8
1400
5000
5400

38

EDISON'S EXHIBIT. 37—11.



Talking Telegraph

Edison
Chas Batchelor

Adams

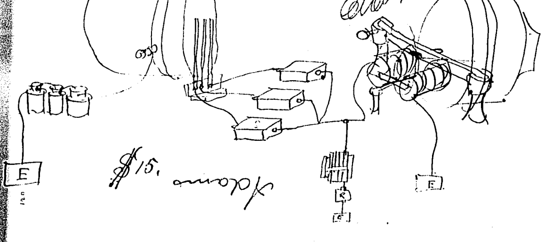
Mch 29 1877

EDISON'S EXHIBIT. 39–11.

No 4.

Kruzi

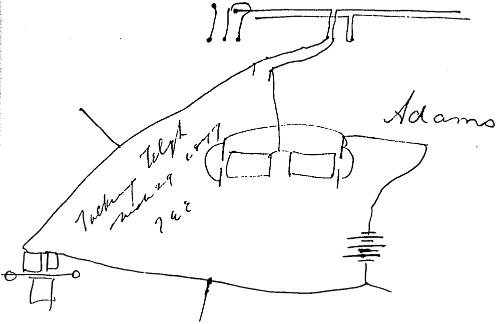
No 4 model
Mch 29 1877
T A Edison
Chas Batchelor



$15.

Adams

EDISON'S EXHIBIT. 40—11.



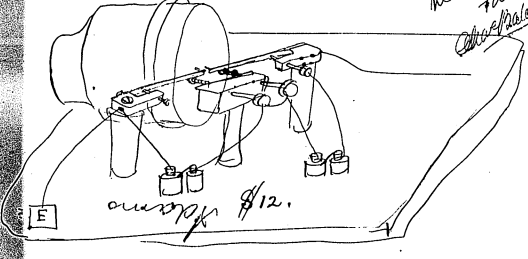
Tucker Telegh
Mch 29 1877
TAE

EDISON'S EXHIBIT. 41—11.

~~No~~ 5.

Kruzi

~~No 2~~ Model
Mch 29 1877
TA Edison
Chas Batchelor

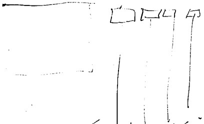


[illegible] $12.

T. A. EDISON,

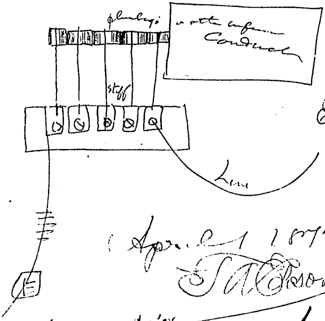
Menlo Park, N. J., ...1880.

No 42 Vol 11.
Apr. 1. 1877
Interference Chinnock



working like this

EDISON'S EXHIBIT. 42—11.

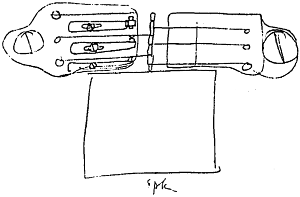

plumbago
or other inferior Conductor
stiff
Line

Speak

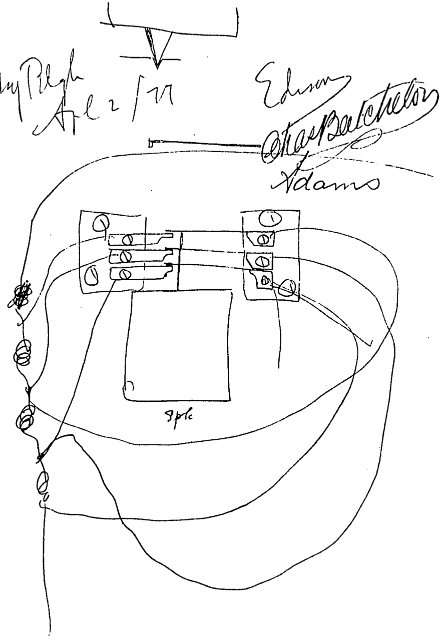
Edisons Exhibit 42-11
S.L.G.

April 1 1877,
T A Edison

Chas Batchelor
Adams



EDISON'S EXHIBIT. 43—11.



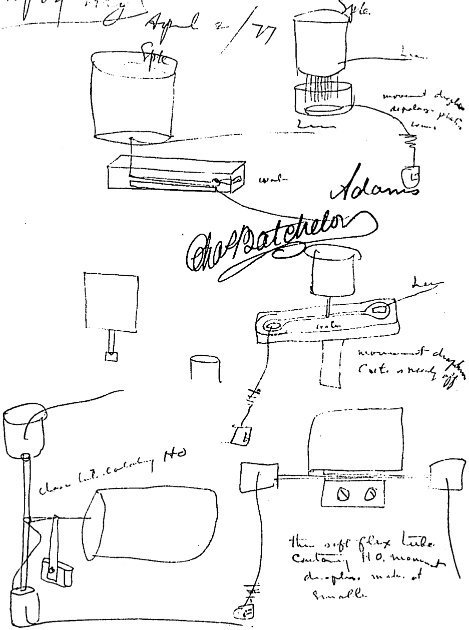
Spring Teleph
Apl 2/77

Edison
Chas Batchelor
Adams

EDISON'S EXHIBIT. 44–11.

Spkg Teleg

April 2/77

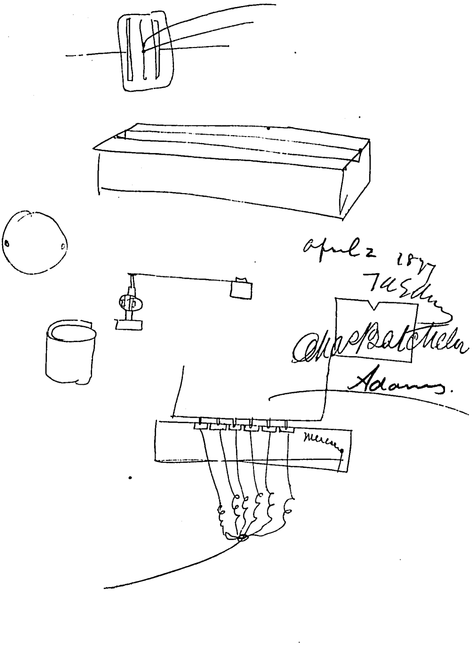

Spk
Spk.
Line
Line
movement diaphm
diaphragm platina
wire
water
Line
water
movement diaphm
Cut. & nearly off
close tube containing HO
thin soft flex tube
Containing H O. movement
diaphm. makes it
smaller

Adams

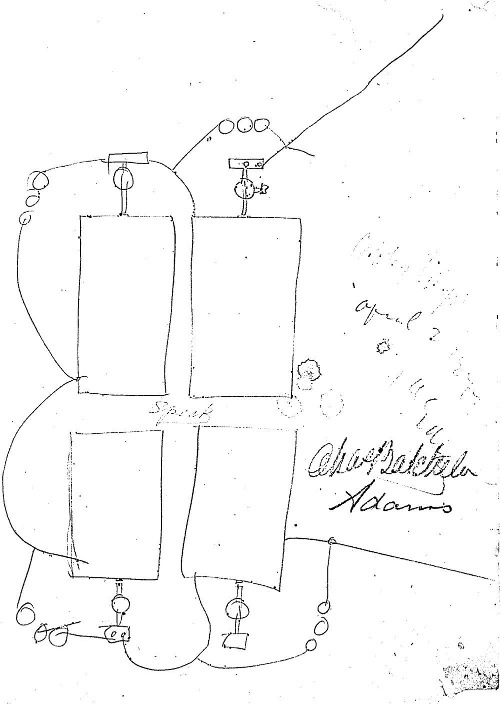
Chas Batchelor

Chas McClellan
Adams

EDISON'S EXHIBIT. 46-11.



April 2 1877
T A Edison
Chas Batchelor
Adams.



[illegible]

april 2

Chas Batchelor
Adams

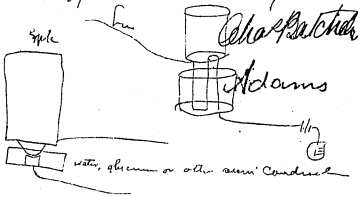
EDISON'S EXHIBIT. 48-11.

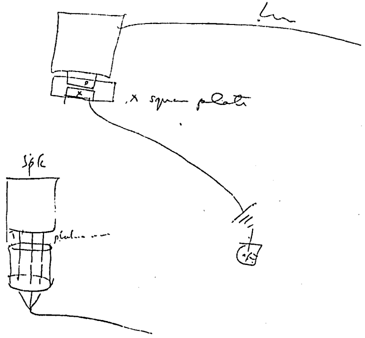
Sp'k'g Telegraph
Apl 2 1877

Edison

Chas Batchelor

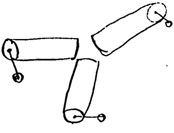
Adams


Spk
Line
water, glycerine or other semi Conductor

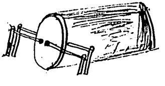

Line
P
X
X square plate
Spk
platina ---

EDISON'S EXHIBIT. 49—11.

Qudon 0003
.5002



Small Pen Engine tube }
With Bk Oxide Manganese
Points



Disk with Points
on both sides

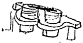
Edison Chas Batchelor
Adams
April 3d 1877

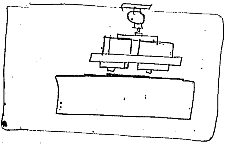
130

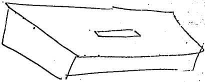
Speaking Telegh-

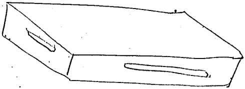
April 4 1877
T A Edison

James Adams
Chas Batchelor









We can get everything perfect except the lisps & hissing parts of speach such as "sh" in shall = get only .o. in coach I propose in addition to the regular diaphram to have an additional diaphram adjusted very delicately to

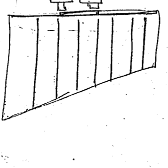
2.

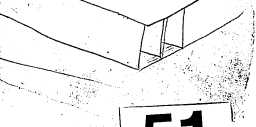
April 4 1877
T A Edison
James Adams

nd to these lisping or hissing Sounds. I propose that it either cut in and out resistance or act in the same manner as the regular diaphram — I have just been testing Substances for imperfect Contact points. I find that good Lumps of black oxide of Manganese [illegible] anthracite & Bituminous Coal only give a moderate resistance somewhat higher than plumbago. and ~~that~~ enormous difference of resistance is obtained [illegible] by Varying the pressure for instance Anthracite Coal having a resistance with light pressure of 1700 ohms is reduced to 300 Ohms by pressure, Manganese Oxide, from 1500 to 600, I propose to Employ these Substances as Contact points.

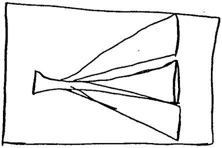
Chas Batchelor

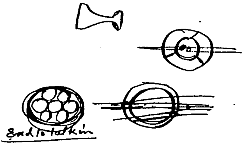
Combination of resonant boxes in one; ie 1 large box & several smaller to reinforce the sound communicated to back of large box



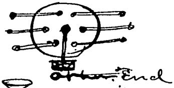


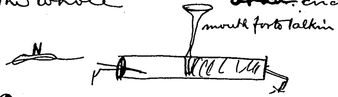
EDISON'S EXHIBIT. 51¼ -11.

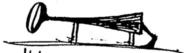



End to talkin

Seven small tubes
With one Diaphragm
over the whole




mouth for to talkin
N



Whisper at one end will make it loud at the Other

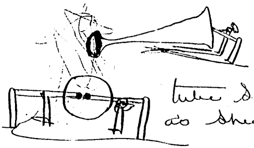
On the Principle of the Speaking trumpet

April 5th 1877

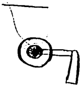
Adams

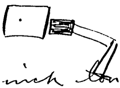
EDISON'S EXHIBIT. 51½-11.

June 5th 1877

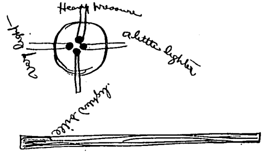


tube same ~~as~~ shape as Speaking trumpet

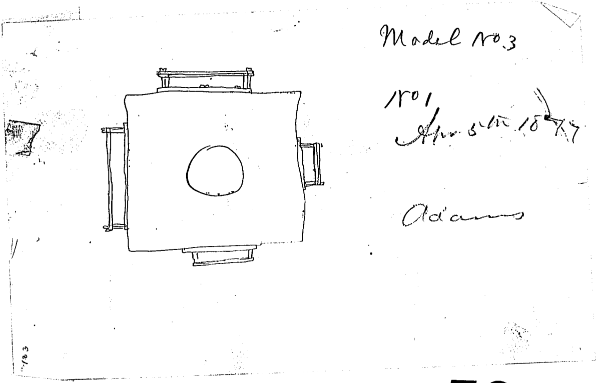




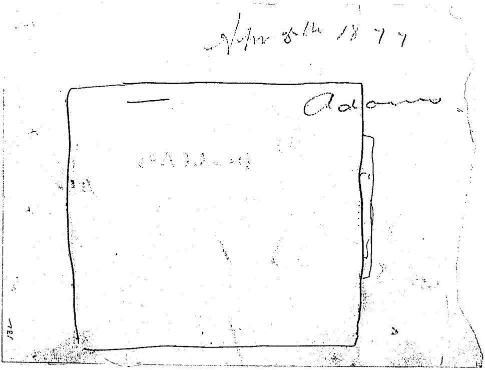
Plumbago one inch long and 1/2 inch across the face


Heavy pressure
a little lighter
very light
lightest side

Thos A. Edison Chas Batchelor James Ad


Model No. 3
No 1
Apr 5th 1877
Adams
163

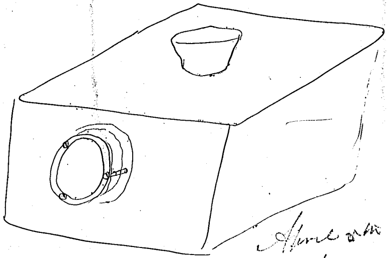
52


Apr 9th 1877
Adams
132

53

Model No 3

No 2



June 20th 1897
Adams

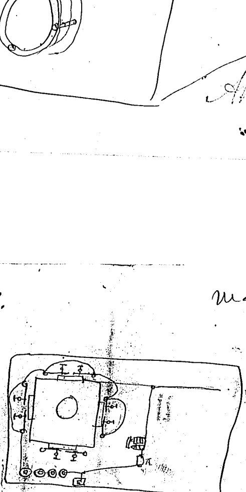
54

No 3.

Model 3.

No 4

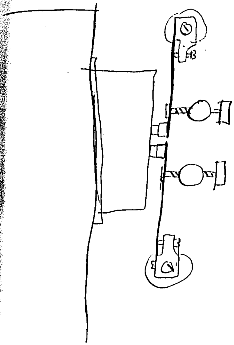
Adams



#18. find date April 5th 1897

55

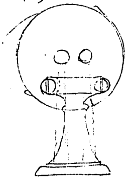
EDISON'S EXHIBIT. 56—11.



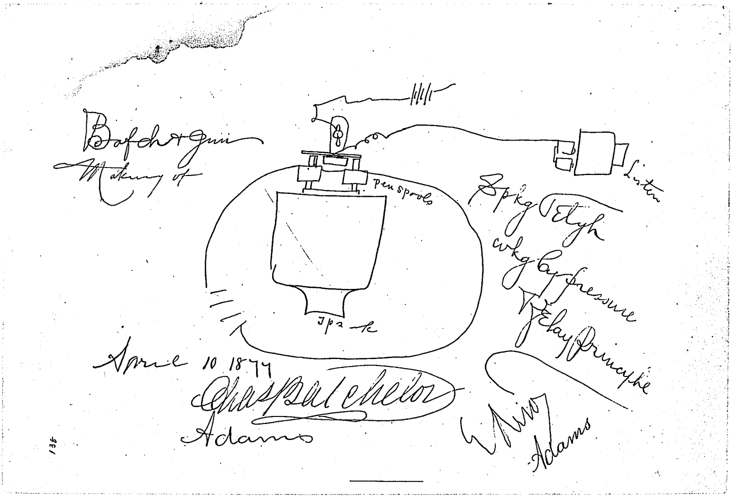
Apr 5th 1877

Model 3 Adams

No 3



[FACSIMILE]


Pen spools
Listen
Jp a k

Bafch + gun
Making of

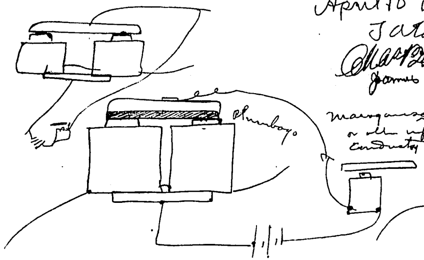
Spkg Telgh
wkg by pressure
Relay Principle

April 10 1877
Chas Batchelor
Adams

Adams

EDISON'S EXHIBIT. 58—11.

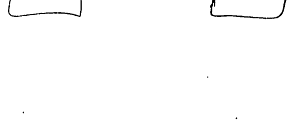
April 10 1877
T A Edison
Chas Batchelor
James Adams



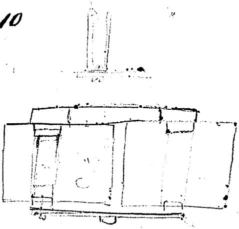
manganese blk or other inferior conductory material

.:. Fig 6 used

Pressure Relay



No. 10
139



$2,0

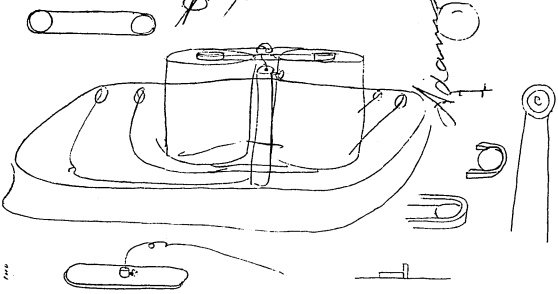
Delvd. Apl. 15th 187[illegible].

Adams

EDISON'S EXHIBIT. 60—11.

No. 9.

~~8~~ 4



Dated Apl. 16th

Press

EDISON'S EXHIBIT. 61-11.

Apr 16th 1877

Pressure Relay Spkg Tel James Adams

Tartrate of Iron no good

Selenium no good

Iron by Hydrogen no good

Phosphate of Iron no good

Oxide Lead to good a conductor

Proto oxide Iron no good

Deuto oxide Lead no good

Carbonate silver works but not so good as Black Lead

Sulphate Lead no good

Oxide Cerium no good

Arsenate Iron no good

Iodate Plumbum no good

Iodide copper to good a conductor — Works fair

Iodide copper 2 Parts Black Lead 2 Parts

Works red Hot

Iodide Iron no good

Cyanide Silver no good

EDISON'S EXHIBIT. 62-11.

Emg. Spkg Tel Reciever

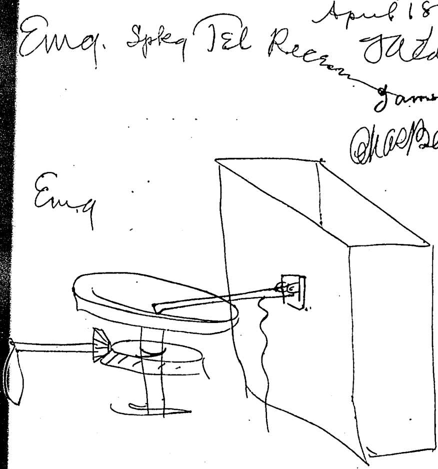
April 18. 1877

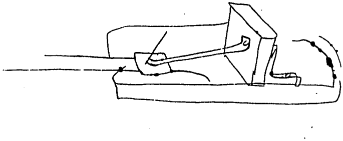
J Adams

James Adams

Chas Batchelor

Emg

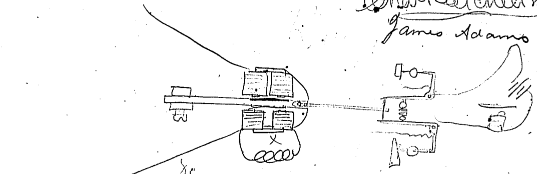




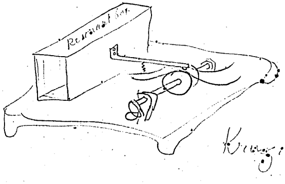
143

Duplex Ac

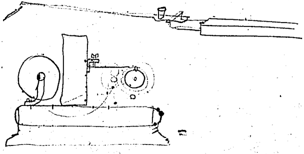
April 19 1877
T A Edison
Chas Batchelor
James Adams



Remarks } adjusted so as same strength on back with shunt on the Self ind of X will cause movement reed.



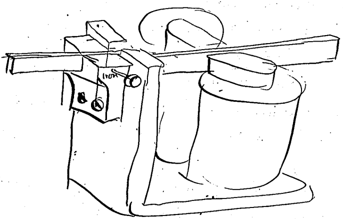
Kruesi



63

11.

$. 2.



Sold: April 19th 1878

Specification of Batchelor [illegible]
Instrument

To all it may Concern=

Be it known that I Chas Batchelor of Newark in the County of Essex State of New Jersey have invented an improvement in Automatic Telegraphs of which the following is a Specification

The object of this invention is to transmit and record Roman letters upon Chemically prepared paper over Several wires at a distance; for, the purpose of reporting the price of Stocks, Gold Etc,

The invention consists in the combination of a roller for giving motion to the Chemically prepared paper with a number of recording points, wires, Styluses and a number of polarized Relays placed in the various circuits the tongues of which connect and disconnect the Current from a

EDISON'S EXHIBIT. 65-11.

112

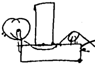
Spkg Telgh

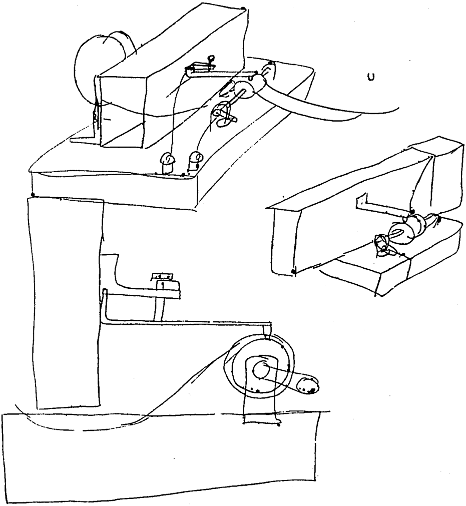
April 19 1877

TAEdison

Chas Batchelor

James Adams

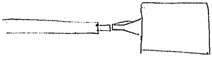


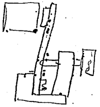


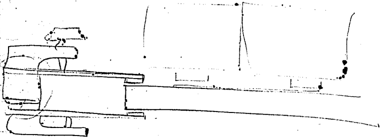
144

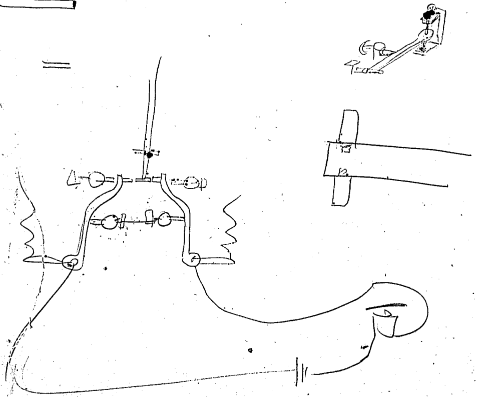
Sextuplex &c

April 19 1877
T A Edison
Chas Batchelor
James Adams

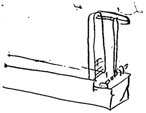








66



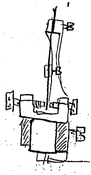


Fig 2,

No 13.

Delvd. April 19th 1872.

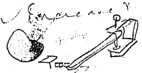
local battery with the recording points.

It further consists in the arrangement of circuits for forming the letters and

April 19 1871 6 p

Kruzi:

Put the levers on Increase & decrease



Relay in Centre =

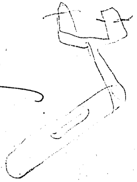
For Relay $12 = for Centre $1\frac{50}{100}$

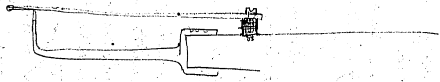
Wm 14 Dolph April 25th 1877

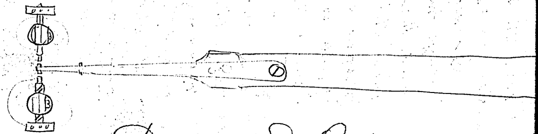
Chemically

Paper upon which the cha
are to be recorded by chemical decomposition This drum is rotated by clockwork and constructed in the usual manner with the exception that

$\$\,2.\frac{75}{100}$ No 14.





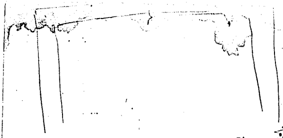


Delivered Apl. 19th 18[illegible]

rotated by hand or any suitable source of power.

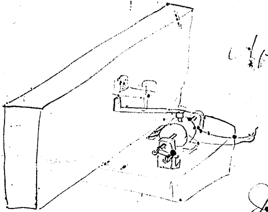
I remark that the polarized Relays might be dispensed with and the recording done directly from the batteries ---- if the proper styluses were used to mark with positive & negative currents, Derived circuits ~~from~~ to the Earth from the main lines may be used for taking more than one copy of the message if the battery power is sufficient

If the Chemical paper is dispensed with and the levers of the polarized Relays massed together over the drum ---- provided with ink wheels inked by an Inking disk or in any suitable manner the record can be in ink instead of the levers closing



E.M.G. Speaking Telegh Recvr—

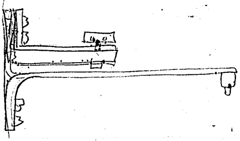
April 17 1877.



Adams

$8.00

about 15 inches Long.



No 19 Deld April 28th 1877

EDISON'S EXHIBIT. 71–11.

Speaker

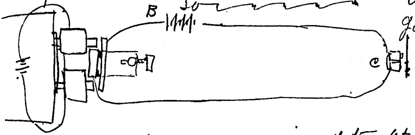
Try this

10 cell of Carbon at B.
20 " " " " "
30 " " " " "

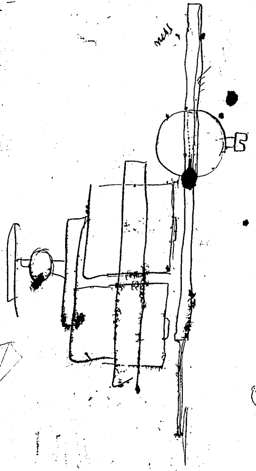
Apl 19 1877

Edison

James Adams



Make Motograph [illegible]eceiver + try at C

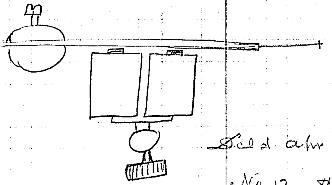


#2.

12.

Dated. April 19th
187[illegible]

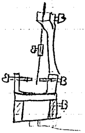
Adams



Sold apr 19th 1877

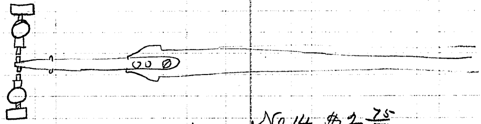
No 12 $2 00

Adams

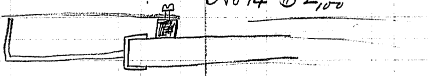


No 13 $2 00
Apr 19th 1877

Adams

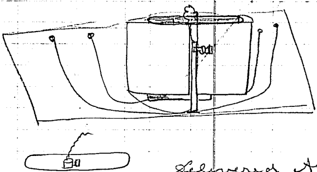


No 14 $\$2\frac{75}{100}$



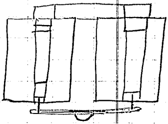
Apr 19th 1877

Adams



Delivered Apr 16th 1877
No 9 $4.00

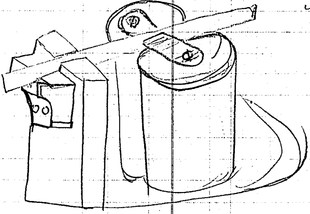
Adams



$2 00

No 10 April 16th 877

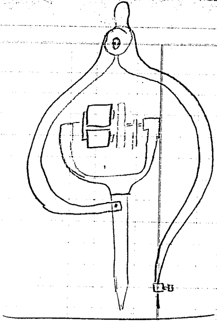
Adams



No 11 $2 00

Delivered Apr 19th 1877

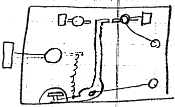
Adams

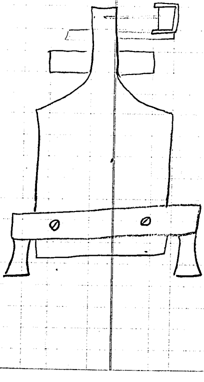


No 15th # 6

Apr 23d 1877

Adams



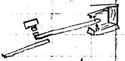


No 16

Apr 23d 1877

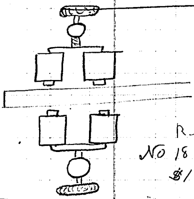
Adams
$10 00

No 17 Apr 25th 1877



lever on Increase & Decrease ready on centers

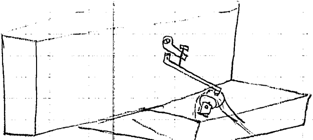
\$1 $\frac{60}{100}$



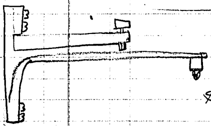
Reed

No 18 Apr 25th 1877

\$1 $\frac{25}{100}$



Em. G. Speaking telegraph

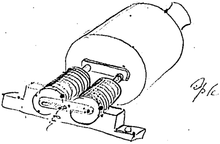


\$ 8 $\frac{0}{100}$

No 19 Apr 25th 1877

148 Spkg Telegh

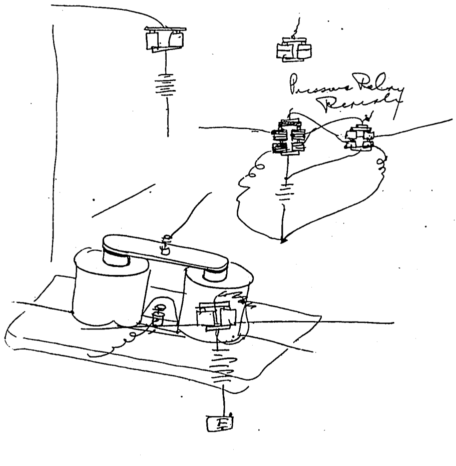
April 19 1877
T A Edison
Chas Batchelor
James Adams



EDISON'S EXHIBIT. 76–11.

Spring Relay

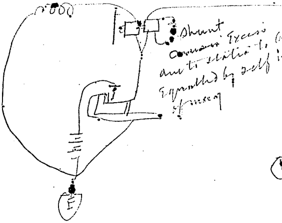
April 20 1877
T A Edison
Chas Batchelor
James Adams

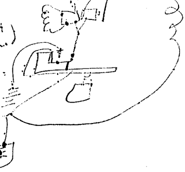

Pressure Relay
Repeater
E

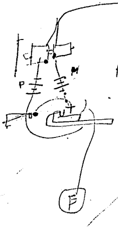
Static discharge & charge on Duplex & Quad

April 20 1879
T A Edison

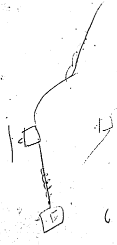
James Adams

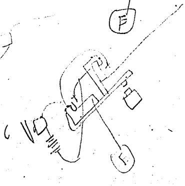

shunt
~~common~~ Excess
due to static to (A
Equalled by self ind
of [illegible]
E





Rev tru a Com relay



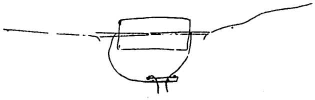


EDISON'S EXHIBIT. 78—11.

Spkg Telegraph 153

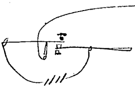
April 23 - 1877
T A Edison
Chas Batchelor
James Adams

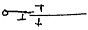
We get the best speaking from shield brass diaphram about 2 inches diam with 3/4 inch surface round point of pressed black lead fastened to a 3/64 thick steel spring with screw with 1 1/2 inches of centre of plumbago & Resonance in Exp (1E) Resonant box with Spg in centre leading to & resting upon. Chem paper moved by drum & belt & wheel The singing with rigid platina point instead of plumbago is simply perfect = It is quite probable that for Speaking Teleg something can be found better than plumbago

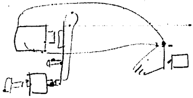


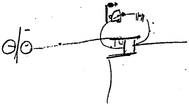
April 23 1877
T A Edison

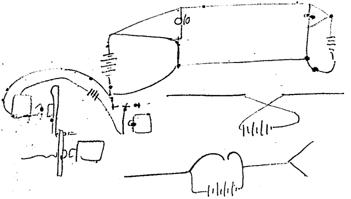
James Adams

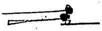


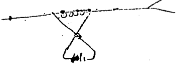








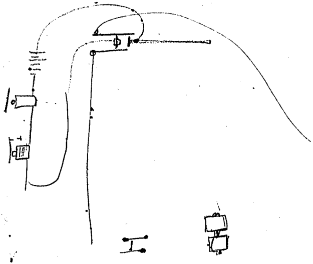


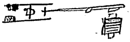


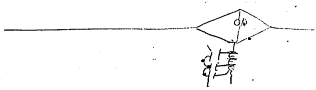
152

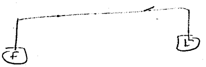
80

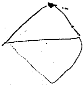
April 23 1879
T A Edison









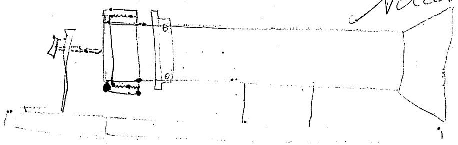


Np Spkg Tel exp 1877

Edison

~~Chas Batchelor~~

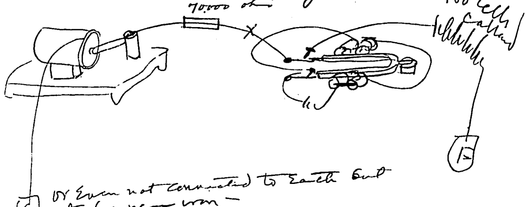
Adams



EDISON'S EXHIBIT. 82-11.

April 24 1877
T A Edison
Chas Batchelor
James Adams

Telephone

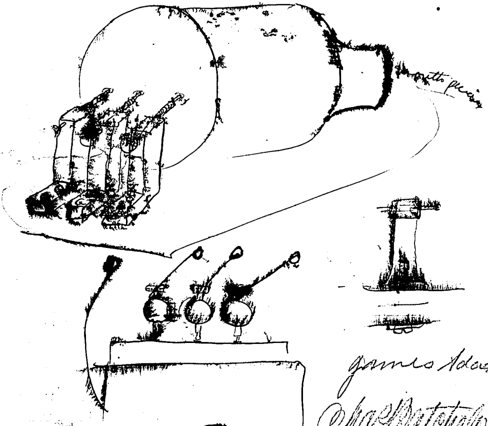


Or Even not connected to Earth but to big piece iron—

The diaphram gives the vibration when the disk of plumbago is adjusted near it is apparently attracted
This is apparently an Tension attraction
if Key would at X be opened no vibrations are heard ~~of~~ on the diaphram =

No 23 [illegible]

S 7/77


mouth piece

James Adams

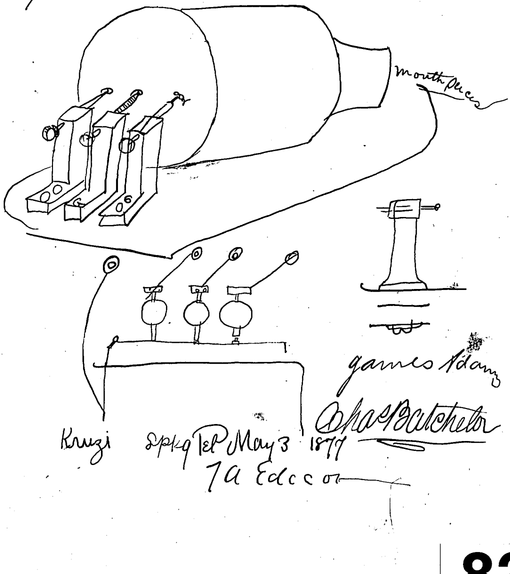
Chas Batchelor

Recvd — Applied May 2 1878
T A Edison

[TRACING]

No 23 Delvd May 3d 1877.

S/7,


mouthpiece

James Adams

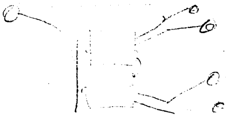
Chas Batchelor

Kruzi Spkg Tel May 3 1877
TA Edison

82/1

[illegible]

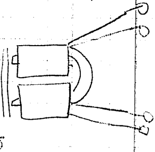
$6



No 25 Dec [illegible] 18[illegible]

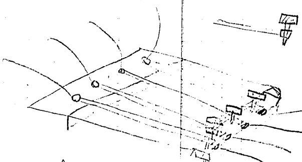
5½ %

wind both the top realays deffer ntal
place the old top the same as the [illegible] one



$6 $\frac{00}{100}$

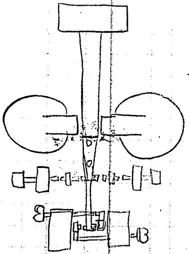
May 8th
No 25



Self Sender May 11th 1877

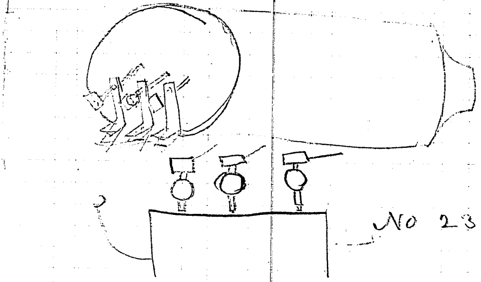
$10 $\frac{00}{100}$

No 26



No. 27
Deftuplex
May 13th 1877

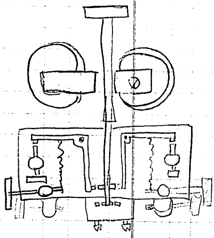
$7 $\frac{00}{100}$



No 23

Speaking telegraph

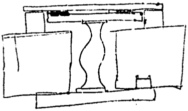
$7 $\frac{00}{100}$

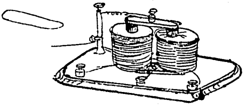


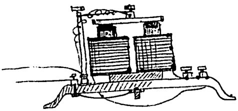
No 24
May 7th

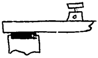
$10 $\frac{00}{100}$

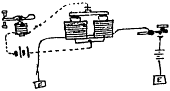
Schuckert

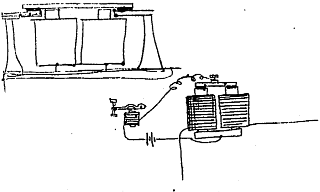








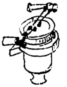




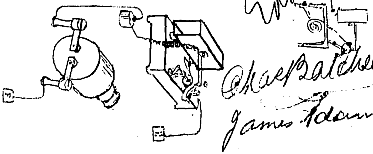
Pressure Relay
May 10 1877

T A Edison
Chas Batchelor
James Adams

EDISON'S EXHIBIT. 87-11.

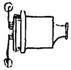


May 10 1877



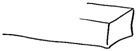
Chas Batchelor

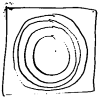
James Adams



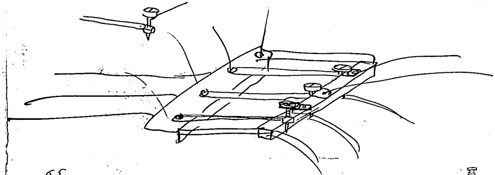
May 10 77

[illegible] D[illegible] 11th 18[illegible]



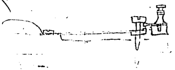


$10,

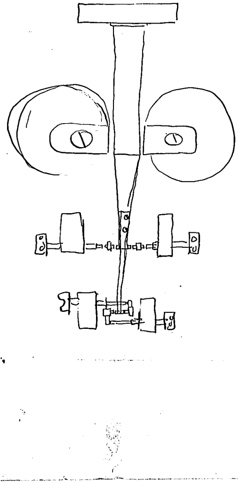


65

Self Sender.



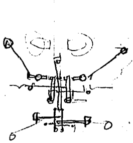
No 27 Delvd. May 13th 1877.



Sextuplex

May 11 1877
T A Edison

No 7.



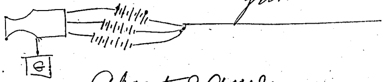
Speaking Telegraph 163

May 18 1877

T A EDISON
Chas Batchelor
James Adams

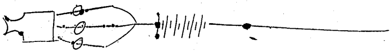
Batchelor

Try-



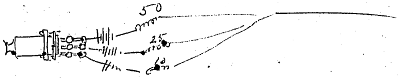
About same

Try



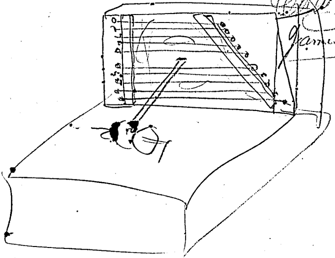
About same

Try



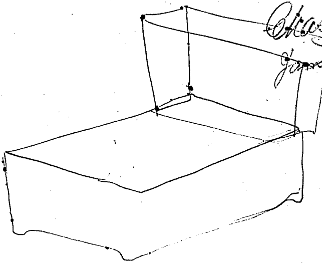
Spkg Telgh

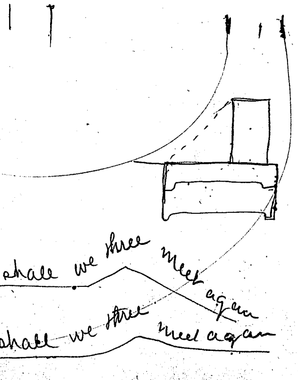
May 18 1877
Spkg Telgh
TAE
Chas Batchelor
James Adams



Spkg Telegh

May 18 1877
T A Edison
Chas Batchelor
James Adams



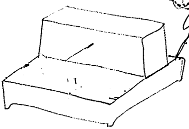


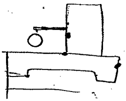
When shall we three meet again

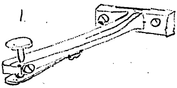
ren shall we three meet again

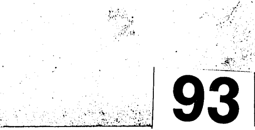
Op key [illegible] B

May 19 1877
T A Edison
Chas Batchelor
James Adams



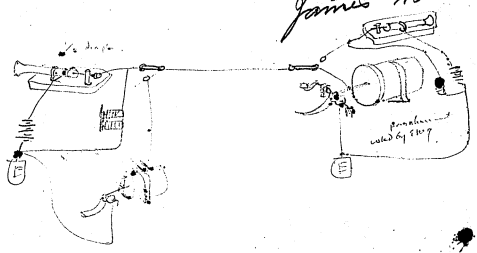


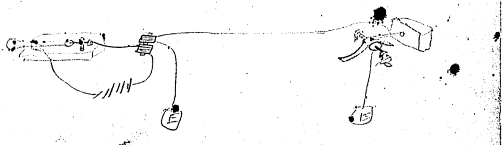


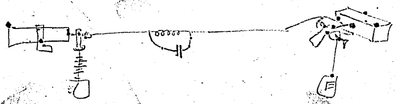


Spkg Telgh

May 19 1877
TA Edison
Chas Batchelor
James Adams


½ diaphm
E
E
[illegible] rotated by [illegible]





EDISON'S EXHIBIT. 95-11.

167

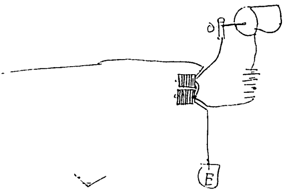
Spkg Telg

May 21 1877

T A Edison

Chas Batchelor

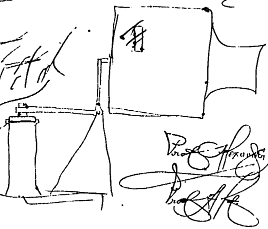
James Adams



Boston

Boston

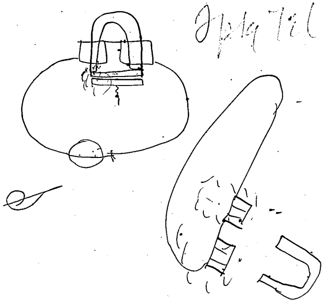
Spkg Teleg



Prof Alexander Graham Bell

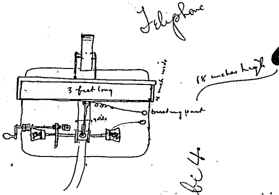
Ip 19 Tel

May 21
77

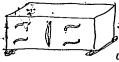


Edison
Chas Batchelor
James Adams

Telephone

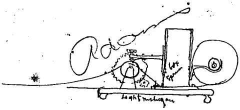

3 feet long
4 inch wide
breaking point
guide
18 inches high

fic 4



3/4 stock spruce Except front that 1/4 inch

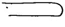
May 24 1877 T A Edison


Adams
1/4 spruce
Light Mahogany

with bridge in Centre where Emb lever is fastened

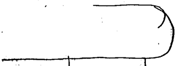
gear 5 to 1 or thereabouts even 10 to 1 or 3 to 1 would answer

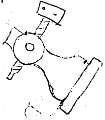
Base Light Mahogany inch stock rounded Edges



also

= round legs 1/2 ~~in~~ inch high thus

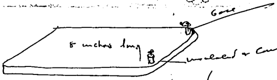




168

Transmitter for Telephone

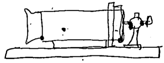
Chas Batchelor
Adams

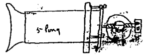

Gone
8 inches long

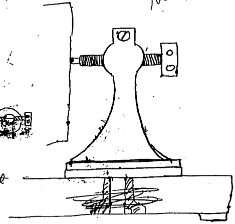
insulated & connected to pillar

1/2 inch cast iron planed on top

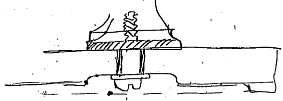
May 24 1877
Thursday

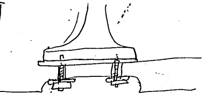






Use pen fly wheel
Tube =





May 25. 1847

Blake Oct 28. 1880

Speaking Telegraph

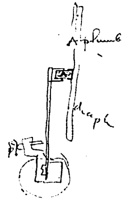
May 25 1877

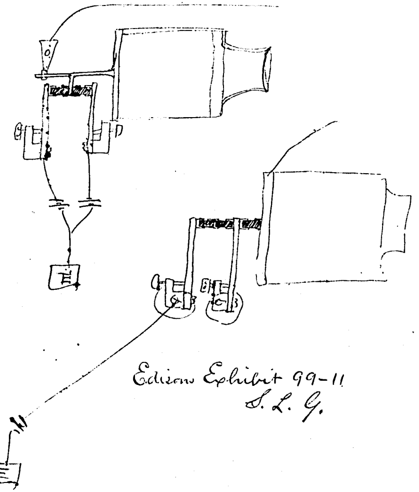
T.A. Edison

James Adams

Chas Batchelor

A plumbago secured to platina Cap and faced with a platina Cap for the purpose of preserving it from abrasion & get the full Effect of pressure





Edison Exhibit 99-11
S. L. G.

EDISON'S EXHIBIT. 100-11.

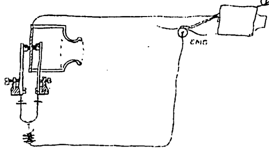
Talking Telegraph

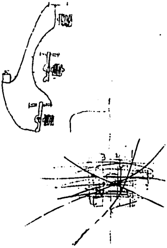
May 25 1877

Thos A Edison

Chas Batchelor

James Adams





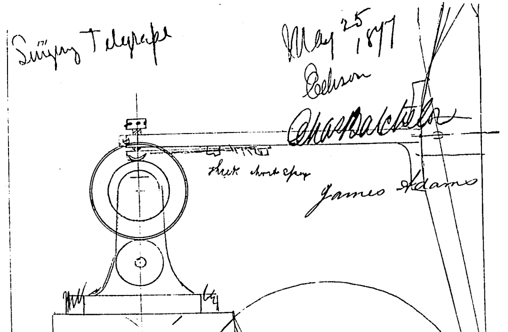
EDISON'S EXHIBIT. 101–11.

Printing Telegraph

May 25 1877
Edison

Chas Batchelor

James Adams


thick short spring

EDISON'S EXHIBIT. 102-11.

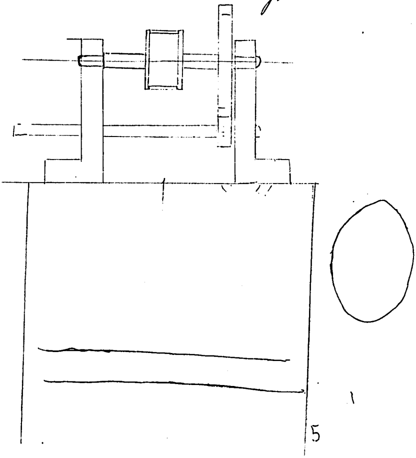
110

Printing Telegraph

May 25 1871

Edison

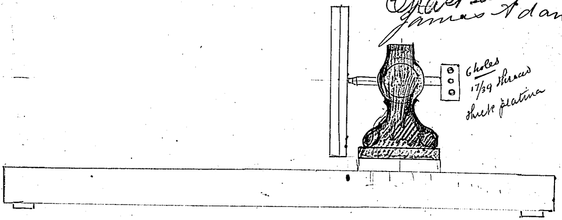
James Adams



Singing Telegraph
172

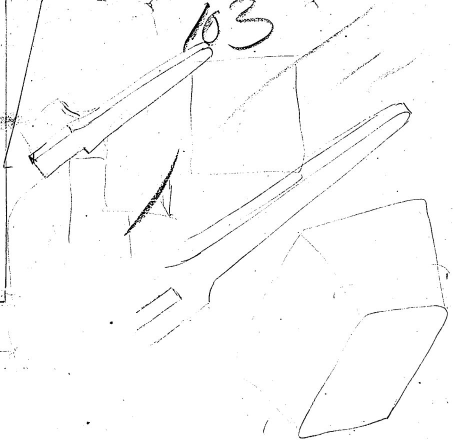
May 25 1877
Edison

Chas Batchelor
James Adams


6 holes
17/39 thread
thick platina

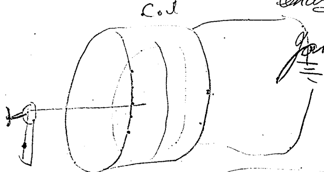
103

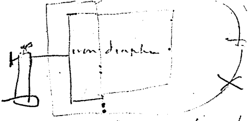
103



Spkg Telegh

May 26 1877
T A Edison
Chas Batchelor
James Adams



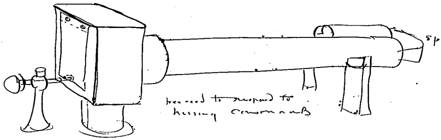

iron diaphm
X

Will it vibrate when X vibrates

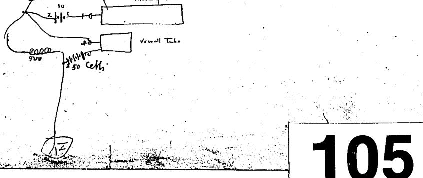
pp221 = 9

Spkg Telegh 105

May 26 1877
T A Edison
Chas Batchelor
James Adams



free reed to respond to hissing consonants

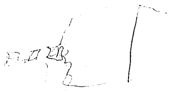

200
500
10
2
c
Hissing Consonant tube
Vowell Tube
500
2
c
50 Cells
Z

T. A. EDISON,

Menlo Park, N. J., ______________ 1880.

No 106 Vol. 11.
May 26. 1877

Chinnock Interference

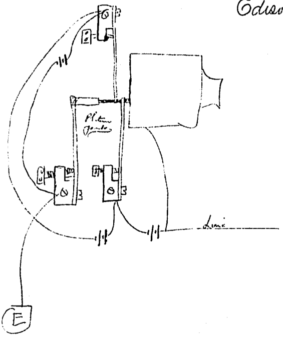


EDISON'S EXHIBIT. 106–11.

180
Speaking Telegraph.

May 26 1877
T.A. Edison
Chas Batchelor
James Adams

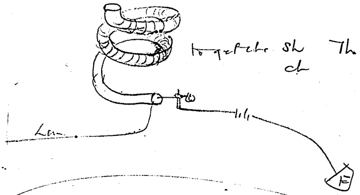
Edisons Exhibit 106—11.
S.L.G.

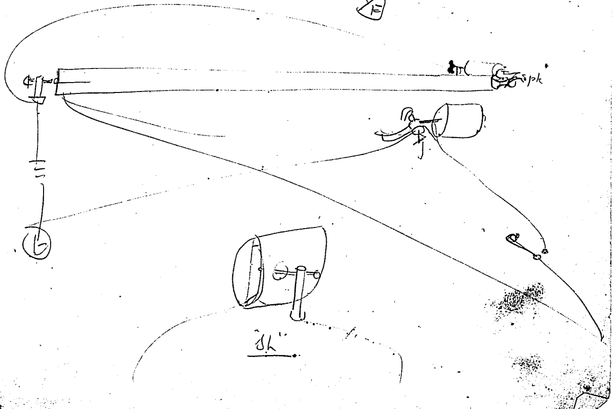

Platina Spring
Line
E

183

Spkg Telegraph

May 26 1877
T A Edison
Chas Batchelor
James Adams


to get the sh
Th
ch
Line
E

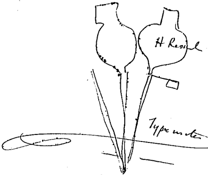


174

Speaking Telegh which prints automatically the speech

May 26 1877
Edison

Chas Batchelor



Each resonator is tuned to respond to any particular string may be adjusted to open & close an Electric Circuit & thus control the type writer or they may be bunched together as chemical recording points like my perforator and these points on paper. the resonators will control which shall print the letters = Bro Ritter suggests strings at grav. Hold a piano of Leonard Myers & has stenographer = K9 ☐

177

Keyboard Talking Telgh

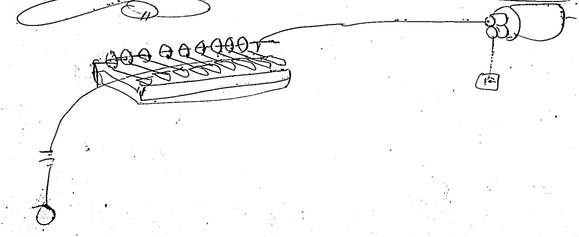
May 26 1877

Edison

Chas Batchelor

I propose to have a long shaft with wheels on having breaks (ie electrical) so arranged with a keyboard that by depressing say the letters T H I S simultaneously that contact springs will one after another send the proper vibrations over the wire to cause the Emg & diaphragm to speak plainly the word this; by this means no difficulty will be had in obtaining the hissing consonants. and as the breaks wheels & contact springs may be arranged in any form and as many as required and the overtones harmonics of the parts of speech can easily be obtained.

~~Turn the [illegible] in your mind Mr~~ E & keep it up



175

Talking Telegraph

May 26 1877

Chas Batchelor
James Adams

I find that it is absolutely essential to perfect the speaking Telegraph that the th' sh ch s and other hissing sounds should be sent over the wire, now the diaphrams we have made do not respond to an appreciable Extent to this hissing Sounds = Now I think these hissing sounds are composed of vibrations and are notes having an exceedingly low rate of vibration pbly 10 per second & weak at that, Now I propose to construct a tube & diaphram which will respond to them and this tube I propose to have made like a telescope so I can increase or decrease it length so as to get a length of tube which will be in tune with these hisses & reinforce them and I propose to have this tube adjusted only to reinforce the hissing there being no trouble in getting the higher rates of vibration without the assistance of the Column of air = if necessary the higher rates can be made on another tube & diaphram the Talker talks into both tubes at once & both serve to close the battery =

EDISON'S EXHIBIT. 111-11.

183

Speaking Telegraph

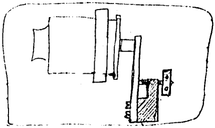
Edisons Exhibit
111-11 S.L. Inston

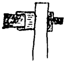
May 29 1877.

Edison

Chas Batchelor

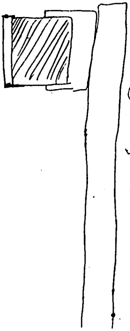
James Adams





P. PlumBago

Platina faced. to prevent abrasion



actual Size

Perhaps this Spring is too Thick
but that will depend upon its
length =

T. A. EDISON,

Menlo Park, N. J., ... 1880.

No 112. Vol 11.

May 31/77

Interference [illegible]

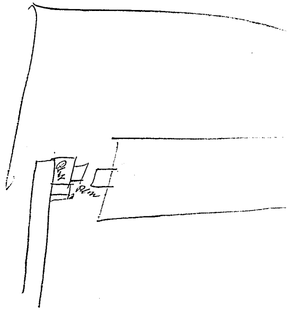
Weight in evidence

T. A. EDISON,

Menlo Park, N. J., ... 1880.

112—11

May 31. 77



EDISON'S EXHIBIT. 112—11.

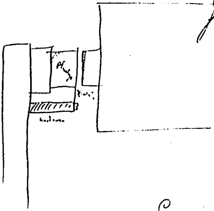
Spkg: Telgh

May 31 1877

Edison

Chas Batchelor

Jas Adams



Edison's Exhibit 112 – 11
S. L. G.

EDISON'S EXHIBIT. 113—11.

Speaking Telegraph — May 31st 1877

50 Cells Callaud Battery — T A Edison
Chas Batchelor

Experiments to determine the availability of Plumbago mixed with different substances for a disc which by variable pressure shall give us variable resistance. 5 gramme weight has piece of platina on it 9/16 diameter. The blocks are all 1in thick

	5 gramme weight	1" & 5 gram	Thickness	
1 Pure Plumbago	75 ohm	75 ohm	5/8"	Jas Adams
2 Plumbago 66.6. Gelatin 33.	over 10.000 ohms	200.	1/2	
3 Plumbago 66. Gum Damar & Linseed Oil .33	200 —	— 75 —	5/8	
On a second test of				
1 Plumbago 66 Gelatin	2.000	——	1/2	
On a third test of				
2 Plumbago 66 + Gelatin 33	1400	400	1/2	
4 Plumbago 66 Plast. Paris 33	over 10.000	100	very sensitive!!!	
			1/2	
Ditto Second test	over 10000	100		

This has more than 1000 probably 20.000 ohms

5 Plumbago 2/3 Collodion 1/3	— 100 —	100	1/2	
6 Plumbago 1/2 Sulphur 1/2.	over 10,000	— 2100 —	7/8	
7 Plumbago 2/3 Isinglass Ammonia dissolved in acetic acid 1/3	— 400 —	— 100 —	5/8	
8 Plumbago 1/2 Sugar 1/2	over 10,000 ——	100 ——	1in	
9 Plumbago 2/3 Tragacanth 1/3	— 200 ——	— 30 —	1/4	
10 Plumbago 2/3 Glue 1/3	over 10.000 ——	400 —		

This is exceedingly variable sometimes ~~a very~~ 10000 then goes to 1000

EDISON'S EXHIBIT. 114—11.

5 gramme weight   1 lb + ¼ gramme   Edison

11 Plumbago ⅔ Sulphur ⅓

This has probably 100.000 ohms with 5 grm
and about 10000 ohms with 1¼ gramme
Sometimes by a little pressure it can
12 be brought down to 2 or 300 ohms but
it is not reliable

Adams

EDISON'S EXHIBIT. 115—11.

Speaking telegraph June 9 1877

Edison

Chas Batchelor

We now put back Plumbago & Isinglass in large diaphragm sender but no good at all

James Adams

EDISON'S EXHIBIT. 116—11.

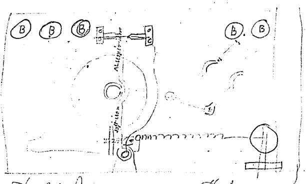
Speaking telegraph June 2nd 1877
T. A. Edison
Chas Batchelor
James Adams

Tried our new speaker made of Cast iron cylinder with diaphragm 6 in on solid iron base and plumbago disc 1 in diameter but it evidently is not so good as former experiments with less diaphragms so

We put in ~~an~~ instrument with 1 3/8 diaphragm and got better results

This with pure plumbago was good
" " Plumbago & sugar no better.
Plumbago & Sulphur no good at all
Plumbago & Tungston best yet

We now took away cylinder from receiver & left the diaphragm standing & found we received better


B
B
B
B
B
Aluminium
soft iron
A

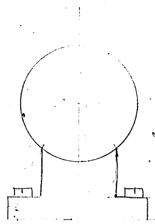
Delvd: June 5th 1877. $7

Speaking Telegraph June 25 1877

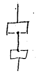
Edison

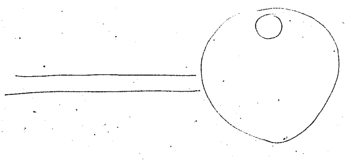
Chas Batchelor

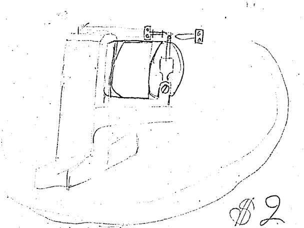
James Adams



Support for tube at end.
3/4 or 5/8 thick







$2

Delivd. June 6th 1855

119

EDISON'S EXHIBIT. 120-11.

Speaking telegraph

June 6 1877
Edison
Chas Batchelor
James Adams

No 154 Pure Plumbago $1 per lb.
previous plumbago used by us only 6c per lb
greatly adulterated — — — —
Articulation 125 could not get the
buckling out whether we had it far
away or close up. Tit clean

---

155 We now put in this number again
15 Plumbago & 11 Rubber
& altered the diaphragm by putting in
one made of copper foil with a piece of
sheet brass 3/4 diameter soldered on to it &
a piece of thick sheet platina 1/4 diameter
soldered on to that
This makes the diaphragm very flexible
in some parts and heavier in centre
Articulation 129 Great margin for
adjustment No Buckling, very good

---

156 4 Plumbago 2 Carb Magnesia
Good. Articulation 129

EDISON'S EXHIBIT. 121–11.

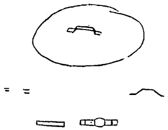
124 237 Plumbago 4 Amalgam 4 Jun 26/77 Edis
Articulation 125 Very loud no buckling

---

135 Per oxide Lead tit + Plumbago straute
No good James Adams

---

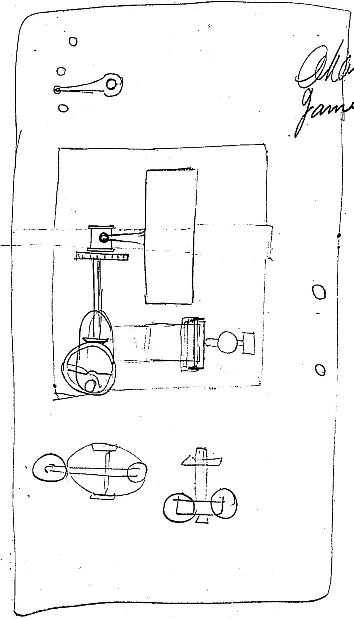
36 4 Plumbago $\frac{750}{MG}$ Fire clay
Very good 130 All right for ordinary
Conversation Very good

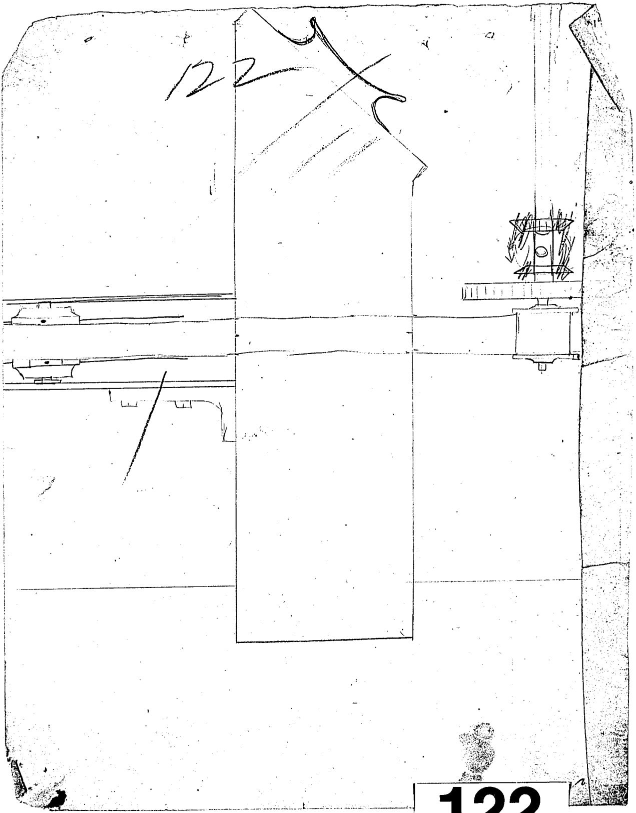


Spkg Tel

June 7 1877

Edison
Chas Batchelor
James Adams

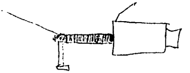




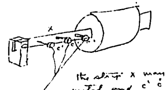
EDISON'S EXHIBIT. 123-11.

N° Speaking Telegraph

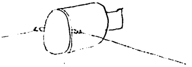
June 7 1877
T A Edison
Chas Batchelor
James Adams



disks of thin metal having an inferior Contact surface and packed together the vibration of the diaphragm serving to give better contact;



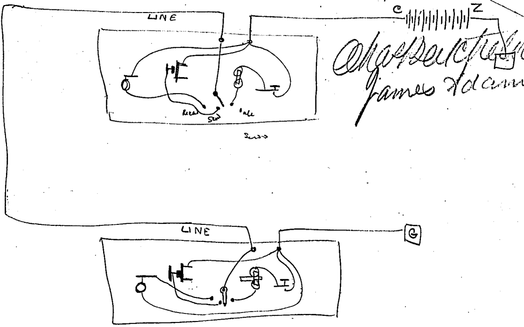
the strip x may be of metal and c' c c may have inferior conducting tips or the strip X may be of an insulating substance covered with an inferior conductor & the points c' c2 c3 of metal, I can have many points the strip may be of any length



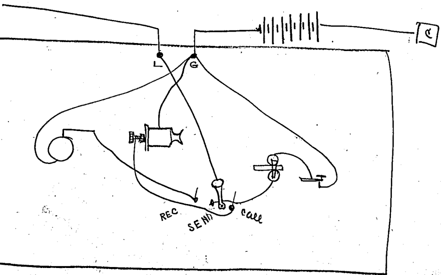
Diaphragm of Vulcanite or a thin insulating substance & covered with Plumbago or some such inferior conductor its surface & that the bending of the diaphragm or spring will increase & decrease the strength of the Current

195 Talking-telegraph

June 7th 1877
T A Edison


LINE
C
Z
Rec
Send
Call
Screw
LINE
G

Chas Batchelor
James Adams

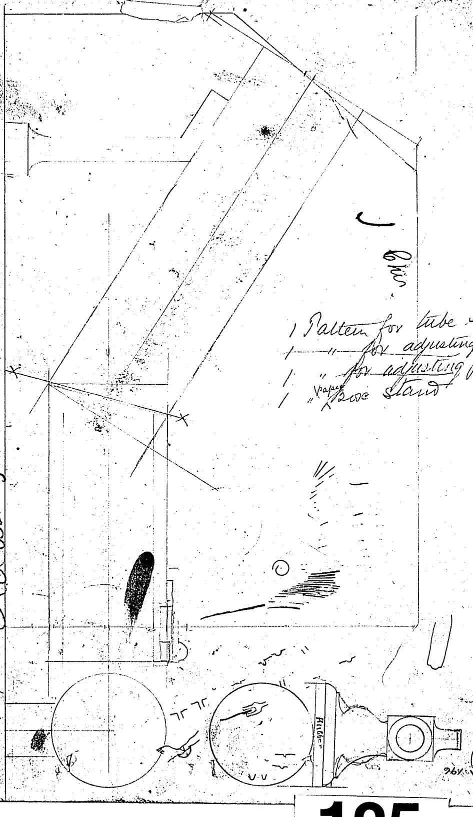

L
G
C
REC
SEND
Call

Connections for Speaking telegraph

June 7th 1877

Adams

11/16



Chas

1 Pattern for tube stand
~~1 " for adjusting chell~~
1 " for adjusting post
1 " ^paper Base stand

194

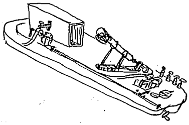
Speaking Tel

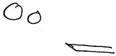
June 7 1877

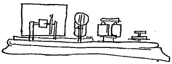
T A Edison

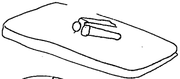
Chas Batchelor

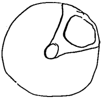
James Adams

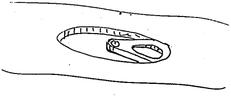


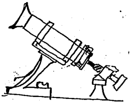


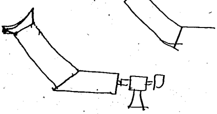












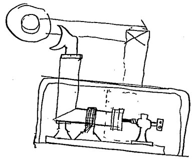
Speaking Telegraph

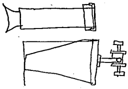
June 7 1877.

T. A. Edison

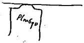
Chas Batchelor

James Adams



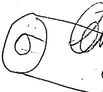


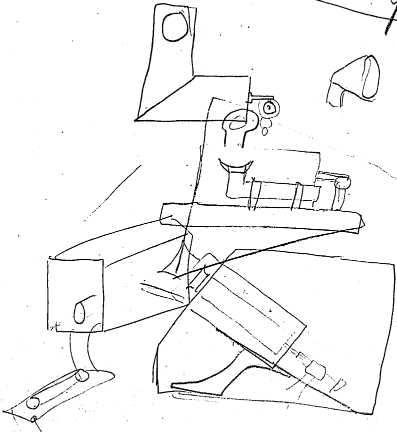
I think that with the plumbago fine points the diaphram ought to be faced with platina

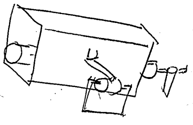


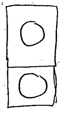
.198

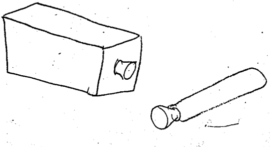
June 7 1877
T A Edison
Chas Batchelor
James Adams.









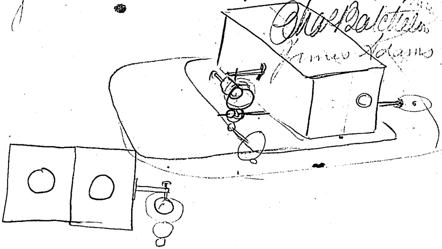


199

Spkg Telgh

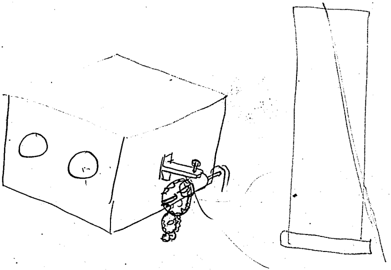
June 7th 1877

745



Chas Batchelor

James Adams

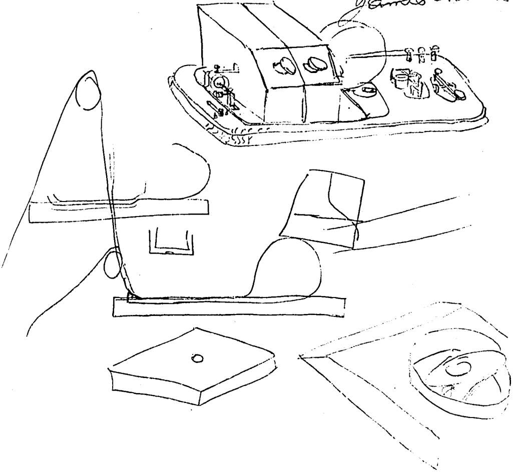


EDISON'S EXHIBIT. 130—11.

200

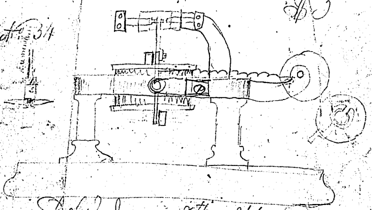
Spkg Telegh

June 7 1877
T A Edison
Chas Batchelor
James Adams



No. 34

$5



Delvd. June 8th 1877

EDISON'S EXHIBIT. 132-11.

201

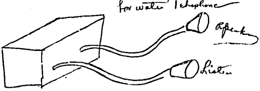
Speaking Telegraph

June 16 1877

T A Edison

Chas Batchelor

for water Telephone

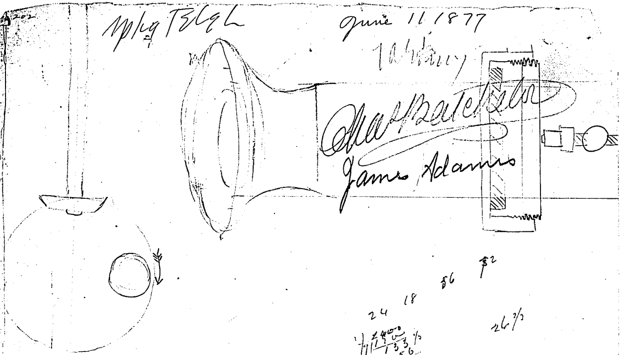

Speaking
Listen

This prevents

202

Spkg Telgh

June 11 1877



Chas Batchelor

James Adams

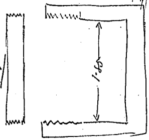
$2

56

24 18

26 2/3

34 gear of screw 8 pitch



18 : 45 24

18 : 45 : 30

3 3/4

20 × 75

24

48

90

24 × 90

90/2400 26 2/3

24 × 48

48/2400 50

18 × 45 = 40

25 × 30 –

30/800 26 2/3

18 : 45 : 22

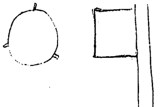
18 45 25 : 30

22 : 55 : 25 : 30

24 – 60 –

EDISON'S EXHIBIT. 134—11.

Speaking Telegraph June 13 1877



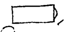
T A Edison

Chas Batchelor

James Adams

Tests of pressed plumbago and other substances to see which is best for speaking

The sticks pressed are this size



~~some buckling accompanies it when adjusted at any distance from diaphragm~~ call it 100 —

Pure Plumbago — very difficult to understand an unknown sentence although it sounds well when you know the sentence before hand

~~15 grammes Plumbago + 2 grammes [illegible]~~

~~good about 100~~ = 110 —

15 Gr. Plumbago No 93 + 6 Gramme Dextrine about 110 — Articulation pretty good

15 Gr Plumbago + 2 gram Coach Body Varnish articulation fair but inconstant about 108 No 90

OOCN

that the platina point on the diaphragm is too small, smaller than the ut on end of Plumbago this must be remedied

15 Plumbago & 2 Kaolin fair about
No85 118 & seems to be a little variable

15 Plumbago & 2 Gelatin fair but
88 only 115. It is not very loud

15 g Plumbago & 2 g Tannin
No89 wheasy & rattling about
112

No 86.
15 g. Plumbago & 4 Salt —
— 95 — very rattly

No 91
15 g Plumbago & 2 Balsam Fir
came rattly & then weakened
right down
104

EDISON'S EXHIBIT. 136-11.

205 Speaking Telegraph — June 13th 1877

T A Edison
Chas Batchelor
James Adams

No 87
15 Gram of Plumbago [illegible] 2 Gram Resin
dissolved in alcohol
good work about 115

No 88
15 Grm Plumbago + 2 gram Isinglass
dissolved in Acetic Acid
pretty Good about 115
still it seems to be inconstant

We now put in another diaphragm made of shield brass with a small platina point in middle

Unknown Plumbago mixture simply elegant at least 125 — It now becomes necessary to find out what this combination is We believe it is Plumbago with a large proportion of Isinglass or Gelatine

No 89 15 Plumbago & 2g. Soft Rubber dissolved in Bisulphide of Carbon very good — at least 125. On this we got whistling and whispering perfectly.

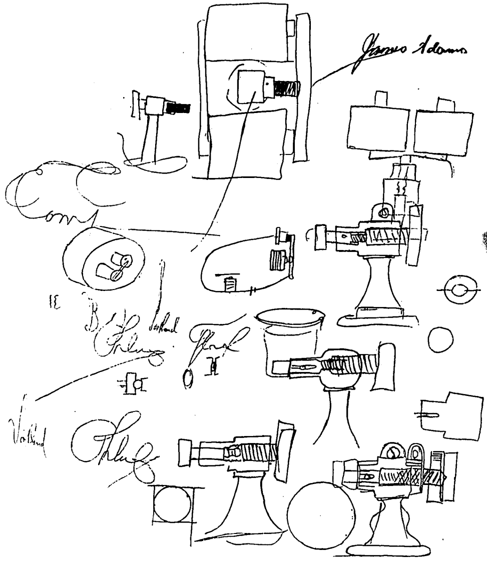
There is one difficulty yet and that is

EDISON'S EXHIBIT. 137-11.

206

Magnetometer

June 14 1877
T A Edison



James Adams

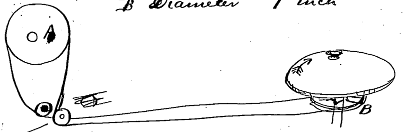
Speaking Telegraph June 14th 1877

Edison

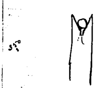
Chas Batchelor

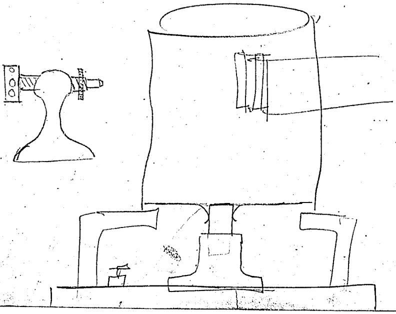
Motion for driving paper feed James Adams

A Diameter $3\frac{1}{2}$ inches
B Diameter 1 inch



Use round belt $\frac{1}{8}$ inch and groove pulleys so





EDISON'S EXHIBIT. 139-11.

208 Speaking telegraph
Continued

June 15th 1877
T A Edison
Chas Batchelor
James Adams

No 8 Comp. 4g. Plumbago 750 mg. Sulphur
Exceedingly variable but when it does work
it is equal to 125. Got whistling but no
whispering

No 121 Comp. 15 Plumbago 6 Sulphur in Bisulphide
of Carbon — Very variable indeed
But when it comes at all it is equal to
125

95 Comp. 15 Plumbago & 2 Balsam Fir
This I think is the best weve got it is equal
to 126 in articulation but I fear it is
inconstant though it did not show it
greatly. The whispering was the best
weve got
We sung a song and could plainly
distinguish the words though this
was the first time we have tried it

See No 9' something wrong

No 83 Comp 15 Plumbago 4 Sulphur in Bisulph-
Carbon very good Articulation equal to
126 We fear it is a little inconstant

EDISON'S EXHIBIT. 140-11.

Speaking Telegraph June 15th 1877

Same continued —

T. A. Edison
Chas Batchelor
James Adams

No 111 equal to 125 as good if not the best we have had yet can get the whistling but not whispering.
Composition 1.500 gram. Isinglass dissolved in 4 grams Acetic Acid
The platina cuts into the the composition a little. No spark holes made

---

We now put in a diaphragm with a piece of platina on centre a little larger the tit on Composition

---

No 110 Composition 15 Plumbago & 2 Woodbridge Clay
Very good but it is inconstant it stands when it does work 125 ——
Can get the whistling only by a fine adjustment also the whispering

---

No 98. Comp. 15 Plumbago and 4 Bermuda Arrowroot
Very good 125 could get whistling and whispering good

No 130 Comp. unknown
equal to 125 Got whistling and whispering well

EDISON'S EXHIBIT. 141–11.

210

Speaking Telegraph June 15th 1877
T A Edison
James Adams Chas Batchelor

No 104 Comp. 15 Plumbago & 4 Balsam Fir
Very good equal to 126 articulation
particularly good and seems constant.
whispering not very good.

No 116 Comp. 15 Plumbago 2 Starch
articulation very good but very ratty
equal to 127. Whispering best we have
had yet seems like talking
We got the sh!! all perfect on this

No 118 – Comp 15 Plumbago & Collodion in unknown
quantity very satisfactory one indeed
apparently very constant
We think we must make this
equal 128. for it appears best in
everything –

---

17 Comp 4 Plumbago 250 MG Sulphate
of Baryta.

We think this is
equal to 128

Articulation	very good
Whistling	good
Whispering	good
Constancy	good

EDISON'S EXHIBIT. 142—11.

"Speaking Telegraph" June 15 1877

continued.

T A Edison
Chas Batchelor
James Adams

No 12 Comp 4 Plumbago 230 m.g. Fire Clay
Think it constant not absolutely sure
Whispering good
Whistling good
Think it equal to 129
Articulation excellent

No 85 Comp 15 Plumbago 2 Kaolin.
Think it constant but only equal to 126
Articulation fair this was about 118 before
the diaphragm was changed

No 105 Comp 15 Plumbago 6 Kaolin
Think it constant but only equal to 126
at the whistling and whispering
Possibly it may be inconstant

---

114 15 Plumbago 6 Starch
Think it extra good on lowest faintest
whisper. It is perfectly constant
Articulation most perfect
it equals 128
Lowest talking comes best
The set is not altered in the least
Bully good !!!

EDISON'S EXHIBIT. 143-11.

512 Speaking Telegraph June 15 1877
T A Edison
Chas Batchelor
James Adams

No. 104 15 Plumbago 2 Gum Dextrine
Inconstant & not equal to more
than 110

15 Plumbago 2 Blk Asphaltum
103 Articulation very good indeed
could not get the whispering
Articulation appeared a little incon-
stant it equals however 126

92 15 Plumbago 2 Balsam Copaiba
So inconstant that it is positively
no good at all —
The most inconstant one yet
when good it is 118.
The comp. is very soft anyhow

EDISON'S EXHIBIT. 144—11.

Speaking Telegraph 213 June 16th 1877

Edison

James Adams Chas Batchelor

102 Comp 15 Plumbago 2 Venice Turp
fair about 125
Tit perfectly clean
Articulation good. but not so good
as some.
Appears constant.

---

101 Comp. 15 Plumbago 2 Oil Cade
About 123 for articulation
It is however very strong & constant
Tit perfectly clean
Very soft Jim broke it pulling it out

---

15 Plumbago 2 Arrowroot.
117 Articulation is 128 on this when low
especially on whispering
At no time was it very strong —
~~Platina a lot~~ no hole in tit.

---

97 15. Plumbago 2 Woodbridge Clay
Articulation weak but 126. (breaks in flakes)
whispering poor & whistling good
soft broke coming out — Tit clean

EDISON'S EXHIBIT. 145-11.

Speaking Telegraph June 16 1877

Edison
Chas Batchelor
James Adams

No 112 Comp 15 Plumbago 4 Kaolin
Not as good as as Plumbago pure
about 98 This probably has not been
pressed properly as we have had
good results from Kaolin before

---

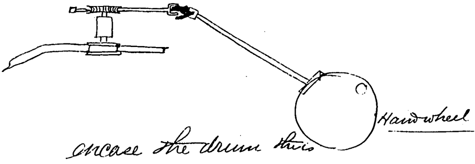
16 Comp 4 Plumbago 250 M.G. Borate of Baryta
Good articulation 12% good generally
but not the Good we are looking for
Tit's clean

215 Speaking Telegraph June 14 1877

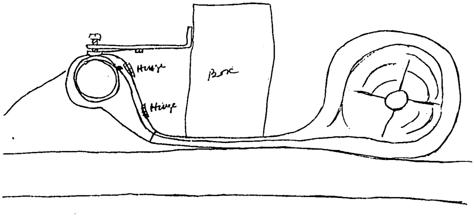
Edison
— Chas Batchelor
— James Adams

Alteration in Model speaker—

Carry the shaft at an angle so as to bring worm on other end of shaft & put drum on end of shaft and encase like drum on receiver of Domestic Tel Co thus:—



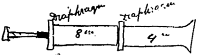
encase the drum thus



213

"Speaking Telegraph June 17 1877
Edison
Chas Batchelor
James Adams

In testing compositions we put two instruments together this



In doing this we noticed an improvement it raised the note to a high one that is when Jim. talked low we got it very high — but it seemed to have extra noises in ——
We tried talking at a diaphragm through tubes of different lengths but found no perceptible difference

---

In showing the speaking telegraph to Proff Barker we used no 114 Plumbago & after using it some time to day we find that the tst was roughened considerably showing it was a little unreliable.

---

15 Comp. Plumbago 2 Oil Spruce
very poor when it comes its articulation is about 125. & it all roughened up very rattly weak and uncertain

EDISON'S EXHIBIT. 148–11.

Speaking Telegraph June 17. 1877

Edison
Chas Batchelor
James Adams

99 Comp 15 Plumbago 2 Flour
Tit scarcely altered —
Articulation 118. weak and very
uncertain

---

89 Comp 15 Plumbago 2 Tannin
So weak we could not place this at
any figure
Tit not altered at all !!! Strange!

---

120 Comp 15 Plumbago 2 Water with Plbgo
No good at all it kills entirely —
Tit all roughened up.

---

1 Comp. 4 grams Plumbago 1 Gram Bicarbonate
of Soda
Bad no articulation and weakens
right down

No 106 Comp. 15 Plumbago 2 Balsam Tolu
Constant about 128 and loud
Tit not altered —

EDISON'S EXHIBIT. 149—11.

Speaking Telegraph June 17 1877
Edison
Chas Batchelor
James Adams

No 18. Composition 4 Plumbago 2 Fire Clay
Not burned
very poor about 95
could get nothing good whether we talk loud or low

No 140 Composition 15 Plumbago 2 Bi Carb. Soda —
Could not get anything at all but occasionally a closing of circuit
equal to 0

No 119. Composition 15 Plumbago 6 Woodbrige Clay.
Very poor about 75

No 109 Composition 15 Plumbago 2 Woodbridge Clay
Very strong at first and dwindles right out ~~so that~~ after 2 sentences it is nothing more than a blurr. Jim says that after he has said a few words & the Plumbago seems to hug the diaphragm & wont leave
This is no good at all

No 2 Composition 4 Plumbago 150MG Bi Carb Soda
Weakens right down - no good — fearfully rattly, inconstant, when it comes about. ~~like~~
100

EDISON'S EXHIBIT. 150–11.

219 Speaking Telegraph June 17 1877
Edison
Chas Batchelor
James Adams

Comp. 15 Plumbago — 4 Flour
113 Inconstant no good
Articulation 125 when good
tit roughened up

---

133 Comp. 15 Plumbago 2 Camphor in Alcohol
Articulation 125 but rattly and when adjusted
so as not to rattle no articulation
Tit burned

Comp. 15 Plumbago 3 H_2O 1 Gelatine —
106 articulation fair but too low to be any good
about 110 when it comes ~~[illegible]~~
Tit scarcely altered.

---

90 Comp 15 Plumbago 2 Coach body varnish
Articulation 129 Constant & loud could
read it through 10,000 ohms
Tit roughened up

No 87 Comp. 15 Plumbago 2 Resin 3 Alcohol
Articulation 129 Constant & strong

EDISON'S EXHIBIT. 151-11.

Speaking Telegraph June 17 1877
Edison

w Comp 15 Plumbago & Chas Batchelor
132 2 Resin James Adams
Articulation good about 125 but
with a grating
Tit roughened up

96 Comp 15 Plumbago 4 Starch
Rattly. weak articulation 100
Tit altered a little —

w
86 Comp 15 Plumbago 4 Dry Salt
Rattly, light, & about 100 —
PHENOMENON The composition was
all holes & had all the gloss from the press
taken off it since moulding by atmosphere

15 Plumbago 6 Dextrine —
93 120 first Class Constant no rattling
Got whispering whistling
Tit all gummed up

Speaking Telegraph June 17 1877

Chas Batchelor

James Adams

No 3 Comp 4 Plumbago 500mg. Bi Carb Soda
Scratchy but ~~started off quite good~~ –
played ~~right out~~ articulation good
about 125
T.F. roughed up

No 15 Comp. 4 Plumbago 750mg Sulphate Baryta
Poor, weak + scratchy
about 140

No 115 Comp 15 Plumbago 2 Sulphur dis in Bisulph carbon
Poor, weak, + scratchy
about 100
T.F. clean

No 136 Comp 15 Plumbago gr 1/500 Bi carb Soda
Poor weak + Scratchy
about 60
No cut on Plumb.
This soda keeps up its reputation for being constantly poor

EDISON'S EXHIBIT. 153—11.

"Speaking Telegraph June 17 1877.

Edison
Chas Batchelor
James Adams

No 14 Comp 4 Plumbago 1/8 500mg Fireclay
Did not get enough over ~~the~~ wire to
pass an opinion on it
O Pt very clean

No 123 Comp. 15 Plumbago 2 Shellac.
Articulation 125 good at ~~first~~ but
rattly towards ~~the end~~)
Pt is all burned up it was spoilt before we used it—

No 131 Comp 15 Plumbago 2 Caoutchouc —
Articulation 129 Whistling whispering
and talking all at the same adjustment.
Pt is roughened up a little.

No 6 4 Plumb. 250MG Sulphur
Good articulation if it was not
for the rattling (weak) but
about 120
Pt pretty well burned

EDISON'S EXHIBIT. 154–11.

22.3 Speaking Telegraph June 17 1877
Edison
Chas Batchelor
James Adams

No
138 15 Plumb. 2 Sulphur
Tits are clean
absolutely nothing

---

15 Plumb. 2 Camphor sal u alcohol
127 Good articulation about 127
got rattly as it went along

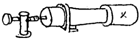
EDISON'S EXHIBIT. 155-11.

Speaking Telegraph

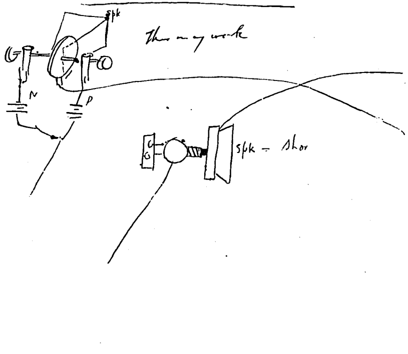
june 17 1877

T A Edison

James Adams



with the second tube & diaphram the talking comes in a higher key apparently an Octave higher & Adams says the sound given out when the diaphram strikes the plumbago is higher with speaking in the 2nd tube than when directly — and the talking is not so good = by lengthening out the regular tube it appeared to come better but after careful test the articulation was found to be inferior to the regular 8 inch tube =



This may work

Speaking Telegraph June 18 1877
Edison
Chas Batchelor
James Adams

1

35 4 Plumbago $\frac{500}{MG}$ Cyanide Copper.
Strong but articulation about same as standard Plumbago 100
Tit clean
Got whistling & whispering but no articulation

---

27 4 Plumbago $1^{\underline{500}}$ Cyanide Copper
articulation and strength good
129 Get any thing on that
Til clean

---

124 15 Plumbago 6 Flour.
Very loud at first but after a little while working with it it went right down about 125
Til clean

---

56 15 Plumbago 4 Carb Magnesia
everything good articulation 129
Tit clean Whistling & Whispering good

EDISON'S EXHIBIT. 157-11.

Speaking Telegraph June 18 1877

Edison James Adams

41 4 Plumbago $\frac{250}{100}$ Iodine
Articulation good 128
Tit clean
Got whispering & whistling ~~clean~~ well

126 4 Plumbago 2 Camphor —
Camphor in Alcohol
This started off quick but it
dwindles away
Articulation when it came was
125 Tit clean

W 44 4 Plumbago 1 Iodine
Articulation good about 128
Tit clean
Whispering not very good
It is a little inconstant

W 71 4 Plumbago 2 Carbonate Magnesia
Very good Articulation 129 —
Tit clean —
This was very loud so much so that
I had t have Jim speak low & then
the articulation was beautiful
I think perfectly constant
the best tonight so far —

221

Speaking Telegraph June 18th 1877

Edison
Chas Batchelor
James Adams

No ~~87~~ 68 Composition ~~8~~ 4 Plumbago 4 ~~2~~ ~~Tannin~~ 250 NG Bisulphide Tin —
Very good articulation about 128
Whispering good & Whistling also
Tit clean.
I noticed that Tannin did not work well
when we had it in before —

No 125 Comp. 15 Plumbago 6 Dry Salt
Very good articulation 128
Whistling & whispering good
Tit perfectly clean

No. 89 Comp 15 Plumbago 2 Tannin —
The articulation is good about 128 got several
sentences consecutively unknown —
Tit not altered; best whispering we have had
a little rattly —

''9 Comp 15 Plumbago 10 Rubber in Bi Sulp.
Current exceedingly weak due no doubt to the
great resistance from such an amount of
Rubber Articulation very good but so low
it could be heard with difficulty

EDISON'S EXHIBIT. 159–11.

229 Speaking Telegraph June 18th 1877

Edison
Chas Batchelor
James Adams

141 Comp 15 Plumbago 4 Rubber in Sulphide Carb.
Tit clean - Good articulation about
126 Whispering distinct

---

143 Comp 15 Plumbago 3 Rubber in Bi sulph
Very good I think best yet
Articulation 129 best on ordinary talking
very good on Whispering & whistling
Tit clean

---

144 Comp 15 Plumbago 6 Rubber
Very good
128 Tit clean

---

146 Comp 15 Plumbago 1 Rubber
Very good
129 Articulation — comes best when
Talking low but can be made to come good
in any talking tit burned a little,

---

145 Comp 15 Plumbago — 8 Rubber
tit a little burned
Articulation very good equal to 128

EDISON'S EXHIBIT. 160–11.

230 Speaking Telegraph June 18 1877

Edison
Chas Batchelor
James Adams

15 Plumbago 9 Rubber

151 Very constant articulation 129
Everything good. Tit a little roughened
This is the one Edison likes!!!

No 15 Plumbago 4 Rubber
148 Constant articulation 129
Bully good
Tit very little altered

No. 4 Plumbago 1 Caustic Magnesia
61 Bully. Articulation good Constant
strong. Tit not altered 128

No 4 Plumbago $1\frac{500}{MG}$ Caustic Magnesia
82. Good articulation 129 good strong
Whistling Whispering very good
Tit not altered

---

4 Plumbago $\frac{250}{MG}$ Caustic Magnesia
80 Good articulation 129 every thing good
Whistling & whispering good excellent
Tit perfectly clean

EDISON'S EXHIBIT. 161-11.

231 Speaking Telegraph

June 18 1877

Edison

Chas Batchelor

James Adams

No. 15 Plumbago 2 Caoutchouc in Bi Sulph

94 Tel: a little roughened

Very good about 128

No 129 4 Plumbago $1^{\underline{500}}$ Gelatin in H_2O

Not so good as last but 125

& generally good

EDISON'S EXHIBIT. 162–11.

212 Speaking Telegraph June 19 1877

Edison
Chas Batchelor
James Adams

28 4 Plumbago 2 Cyanide Copper.
Loud but no articulation 100
Does not improve the Plumbago at all
Tit clean

---

127 15 Plumbago 2 Camphor. sat by Edison
Articulation 129 good all over
tit clean & pretty constant

---

48 4 Plumbago 1 Sulphur
Articulation 129 very good (Strange)
Whistling and whispering very good
Tit clean

---

69 15 Plumbago — 1 Carbonate Magnesia
Excellent articulation 129
very good indeed. Tit a little burned
Constant

---

37 4 Plumbago $\frac{750}{140}$ Cyanide Copper —
Very slight articulation not more than
Pure Plumbago 100 Very strong
Tit a little burned Loud Whistling

EDISON'S EXHIBIT. 163–11.

233 Speaking Telegraph June 19 1877

Edison
Chas Batchelor
James Adams

We now put in an ordinary parchment diaphragm with platina centre & tried

No 151 15 Plumbago 9 Rubber
Did not work and we altered back & left this for some other time —

Brass diaphragm again
No 151 and put back same paper we had ~~last night~~
— O.K. good

No 32 4 Plumbago $\frac{750}{MG}$ Phos Iron
Articulation about 125 but rather inconstant got whistling and whispering pretty good
T.I. clean

No 45 4 Plumbago 1 $\frac{600}{MG}$ Iodine
Pretty good articulation but not above 120 inconstant could not get whispering & whistling ——— T.I. clean

---

No 46 4 Plumbago 1 Borate of Baryta
Articulation seems excellent but a little inconstant. Whispering & Talking are bad
T.I. clean

EDISON'S EXHIBIT. 164–11.

No	G	Mg	
97✓	2	236	Woodbridge Clay
98✓			Bermuda Arrowroot
99✓	2		Flour
100✓	2		Balsam Fir
101✓	2		Oil Cade.
102✓	2		Venice Turpentine
103✓	2		Black Asphaltum.
104✓	2		Gum Dextrine
105✓	6		Kaolin
106✓	1		Gelatin + 3 grams water
107✓	2		oil Spruce
108✓	4		Balsam Fir
109✓	4		Woodbridge Clay
110✓	2		Woodbridge Clay
111✓	1	500	Isinglass 4 grms Acetic acid.
112✓	4		Kaolin
113✓	4		Flour
114✓	6		Starch,
115✓	2		Sulphur dissolved in Bisulphide Carbon
116✓	2		Starch
117✓	2		Bermuda arrowroot
118✓			Collodion unknown quantity
119✓	6		Woodbridge Clay
120✓	2		Water with Pbgo –
121✓	6		Sulphur in Bisulph Carbon
122✓	2		Furniture Varnish
123✓	2		Shellac Tit spoilt
124✓	6		Flour
125✓	6		Dry Salt –
126✓	–		Camphor in Alcohol

Jan 20 1877

Tes

Chas Batchelor

James Adams

EDISON'S EXHIBIT. 165–11.

237	G.	Mg	
70✓	2		Bisulphuret Tin
71✓	2		Carbonate Magnesia.
72✓	2		Lycopodium
73✓		500	Caustic Magnesia.
74✓		750	Bisulphuret Tin.
75✓		750	Lycopodium
76✓	1	500	Lycopodium
77✓		500	Lycopodium
78	5		Soapstone 15 pbgo
79✓	1	500	Valerianate Zinc
80✓		250	Caustic Magnesia
81	4		Soapstone 15 pbgo.
82✓	1	500	Caustic Magnesia.
83 84			The following are all 15 grms of Plumbago. made by guin = tried them =
83✓			sulphur dissolved in Bisulphide Carbon
84	2		Isinglass dissolved in 6 grms Acetic Acid ·
85	2		Kaolin
86	4		Dry Salt =
87	2		Rosin in 3 grms Alcohol
88	2		Gelatin in 2 grms Water.
89	2		Tannin =
90	2		Coach body Varnish
91	6		Balsam Fir =
92	2		Balsam Copabia.
93	6		Dextrine
9'	2		Caoutchouc Dissolved in Bisulph Carbon.
			grms 15 = not yet tried
95✓	2		Balsam Fir ·
96✓	4		Starch

Jan 20 1877

TA Edison

Chas Batchelor

James Adams

EDISON'S EXHIBIT. 166—11.

no	G	Mg	
	250		
127✓	2		Camphor: saturated sol alcohol. Edison made this
128✓	2		Dry Ball
129✓	1	500	Gelatin - HO
130✓			The Unknown that got good speaking from ...
131	2		Caoutchouc, that got best talking with
132✓	2		Rosin
133✓	2		Camphor, sat alcohol
134✓	6		oil Spruce "
			These are the 4 grm pkgo
135	1	500	Sulphur
136✓	1	500	Bicarbonate Soda -
137	1		Isinglass = 2 acetic acid in 15 pkgo — grms
138	2		Sulphur
139		250	Bicarbonate Soda -
140✓	2		Bicarbonate Soda -
141	4	—	Rubber X diss. in Bi-Sulph Carbon 15 Plumbago
142	5	—	Rubber " " " " "
143	3	—	Rubber X " " " " "
144	6	—	Rubber X " " " " "
145	8	—	Rubber X " " " " "
146	1	—	Rubber X ———
147	2	—	Rubber ———
148	7	—	Rubber X ———
149	10	—	Rubber X ———
150	11	—	Rubber
151	9	—	Rubber X
152			
153			
154			

Jan 20 1877

T. A. Edison

Chas Batchelor

James Adams

EDISON'S EXHIBIT. 167-11.

Apr 26 1879

no	Gr	Mg		no	Gr	Mg	
21 ✓	1	500	Tripoli "L" 4.	46 ✓	1		Borate Baryta 4
22		500	Borate Baryta. 4	47 ✓	2		Iodine 4
23 ✓	1	500	Bisulphuret of Tin 4	48 ✓	1		Sulphur 4
24 ✓	1	500	Phosphate of Iron 4	49 ✓		250	Tripoli 4
25 ✓	2		Cyanide Copper 4	50 ✓	7 -		Soapstone · thin in 15 Plbgo
26 ✓		250	Borate Baryta. 4	51 ✓	2-		Tripoli 4
27 ✓	1	500	Cyanide Copper. 4	52 ✓	3		Soapstone, in 15 gr Pbgo
28 ✓	1		Cyanide Copper. 4	53 ✓	1		Soapstone in 15 Pbgo
29	2		Phosphate Iron. 4	54 ✓	6		Carb Magnesia 15. Pbgo-
30 ✓	1		Tripoli 4	55 ✓	3		Carb Magnesia 15 Pbgo.
31		250	Cyanide Copper. 4	56 ✓	4		Carbonate Magnesia 15 Pbgo
32 ✓		750	Phosphate Iron 4	57 ✓	8		Carb. Magnesia 15 Plbgo
33		500	Phosphate Iron 4	58 ✓	6		Soapstone 15 Plbgo
34	1		Phosphate Iron 4	59 ✓	—	250	Phos Iron 4 Plbgo
35 ✓		500	Cyanide Copper 4	60 ✓	10	---	Soapstone - 15 Plbgo
36 ✓		750	Fire Clay - 4	61	1 ×	—	Caus: Magnesia 4 [illegible]
37 ✓		750	Cyanide Copper 4	62 ✓	2	—	Caus. Magnesia 4 ~~15 Plbgo~~
38 ✓		750	Borate Baryta 4	63 ✓	-	750	Caus Magnesia 4 ~~15 Plbgo~~.
3939		750	Iodine, 4	64 ✓		500	Bi Sulph Tin 4 ~~15~~ Plbgo
40 ✓		500	Iodine. 4	65 ✓	1		Lycopodium 4
41 ✓		250	Iodine. 4	66	—	250	Lycopodium 4
42 ✓	2		Borate Baryta. 4	67	1		Bisulphuret Tin 4
43 ✓	1	500	Borate Baryta 4	68 ✓		250	Bisulphuret Tin.
44 ✓	1		Iodine. 4	69	1		Carb Magnesia 15 Plbgo
45 ✓	1	500	Iodine 4				

Chas Batchelor

EDISON'S EXHIBIT. 168-11.

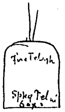
No 13

Baking 1 & 2

	G	MG		
1✓	1		Bi Carbonate of soda	
2✓		750	Bi Carbonate of soda	
3✓		320	Bi Carbonate of soda	
4		500	Iodine	
5	2		Valerianate zinc	
6		250	~~Valerianate zinc~~	Sulphur
7		750	Valerianate zinc	
8✓		750	Sulphur	
9	2		Sulphate Baryta	
10	1	500	Sulphate Baryta	
11	1		Sulphate Baryta	
12		200	Fire Clay	
13		100	Fire Clay	
14✓	1	300	Fire Clay	
15		750	Sulphate Baryta	
16✓		500	do do	
17✓		250	do - do	
18✓	2		Fire Clay	
19✓		750	Tripoli "L"	
20✓		500	Tripoli "L"	

June 20 1877
TA Edison
Chas Batchelor
James Adams

all three in 4 grm. plumbago

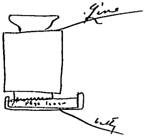

Fine Telegh
Spkg Tele
60x?

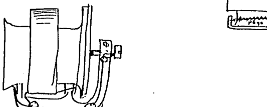
June 21 1877
T.A. Edison
Chas Batchelor
James Adams

Made an Electric pen with a chisel instead of a needle ~~today~~ ~~to cut~~ tin foil on glass - Made a pen with 5 needles for ruling music =

Speaking Telegraph

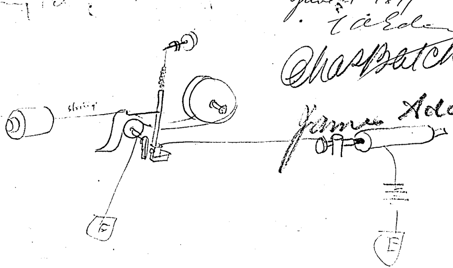
~~got~~ Aug 3rd 1877


Line
Plbgo loose
Btty

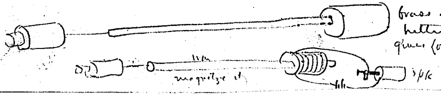


241 Talking Tel

June 21 1877
T A Edison
Chas Batchelor
James Adams

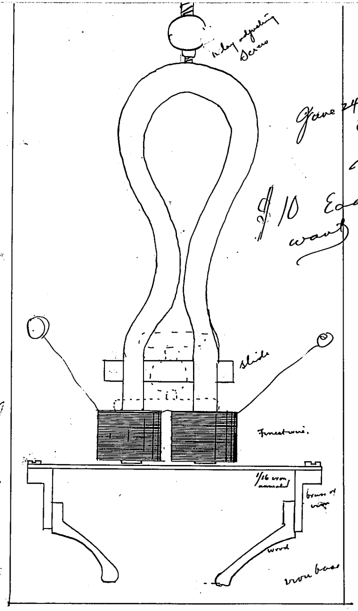


Hotel annunciator


magnetize it
spk

brass diaphragm hitting End wire gives longitudinal vibration

No. 39 Delivd June 30th 1877


Relay adjusting Screw
slide
Finest wire.
1/16 iron annealed
brass or copper
wood
iron base

June 24 1877 TAEdison

$10 Each want 2 of them

one made without steel magnet of soft iron Core

EDISON'S EXHIBIT. 172-11.

251 Speaking Telegraph June 24 1877

Edison
Chas Batchelor
James Adams

No
152 1/2 Plumbago 1/2 Per Oxide Manganese
153 2/3 Plumbago 1/3 Bronze Powder.
154 Pure Plumbago $1 per lb
155 Black oxide copper—
156 Plumbago 4 Grains Carb. Magnesia 2 Grains
157 Plumbago 4 " Amalgam 4 "
158 " 4 " Lit made of Per oxide Lead Body Plum.

Speaking telegraph June 24 1877

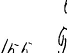
Edison
Chas Batchelor
James Adams

No
153 2/3 Plumbago 1/3 Bronze powder
This is not good the articulation
is 110

---

152 1/2 Plumbago 1/2 Peroxide Manganese
This is pretty good articulation
about 125 but not very Constant

---

154 Solid piece Battery Carbon turned
up in lathe
Articulation fair and louder
than usual

but rattles exceedingly & buckles

---

155 Piece of wrought iron protooxidized by fire
Exceedingly loud Articulation 126
had not the rattles noticed in
last one

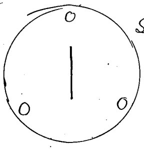
These experiments are [illegible] E.

247 Speaking Telegraph June 24 1877

Edison

Chas Batchelor
James Adams

In our speaking instrument we cut a slot in the diaphragm thus:— in order to get the low sounds such as 'sh', 'th', and others



This so far is a failure

During the night we could not get anything on ordinary plumbagos we used before but about 4 AM we got it right by altering a wire and making a new plumbago We thought from this that the composition must have deteriorated but we can not tell until we have investigate

These experiments are unreliable

Batchelor

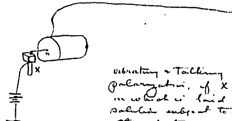
EDISON'S EXHIBIT. 175-11.

246

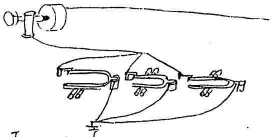
Speaking Telegraph

June 24 1877

T A Edison
Chas Batchelor
James Adams

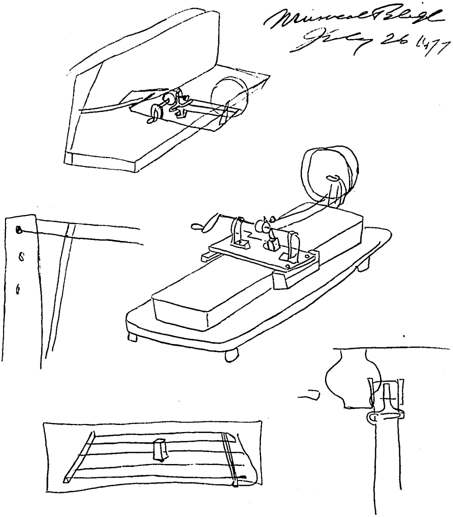


Vibrating & Talking by the Effects of polarization, if X is an aluminum block on which is laid a material [absorbent] containing a solution subject to instantaneous polarization the vibration of n acting upon the material will cause vibrations of variable strength to go over the circuit by reason of polarization depolarization —



Tuning forks/reeds given the giving of proper vibrations of ~~apply~~ & the plumbago & electrophone serving only to increase & decrease the strength of the current to give articulation

EDISON'S EXHIBIT. 176-11.



Musical Sleigh
July 26 1877

EDISON'S EXHIBIT. 176-11.

Speaking Telegraph 745 June 24 1877

Edison
Chas Batchelor
James Adams

W 53 15 Plumbago 1 Soapstone
Very bad about 95

---

42 4 Plumbago 2 Borate Baryta
No good at all could get nothing
but spurts

---

59 4 Plumbago $\frac{250}{MG}$ Pho Iron —
Articulation good 128 good
Pt clean

---

23 4 Plumbago 1 $\frac{500}{MC}$ Bisulphuret Tin
No good at all could get nothing
Pt clean

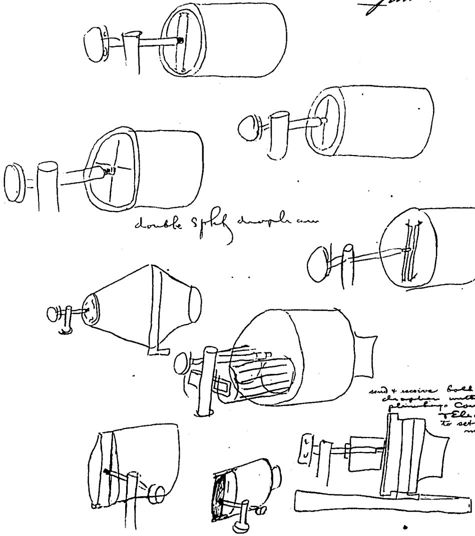
These experiments
are unreliable

EDISON'S EXHIBIT. 177—11.

243

Speaking Telegraph

June 24 1877
T A Edison
Chas Batchelor
James Adams



double spkg diaphram

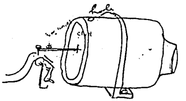
send + receive both on one diaphram with plumbago Contact & Electro magnet to set diaphram in motion.

EDISON'S EXHIBIT. 178-11.

247

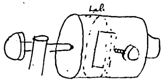
Spkg Telegraph

June 24 1877
TA Edison
Chas Batchelor
James Adams

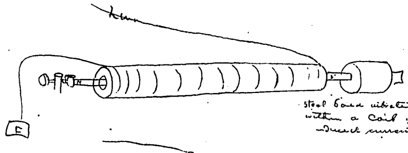


I propose to use an iron point platinized also a point of pure gas retort Carbon also compressed Bronze or other metallic powder with various material,

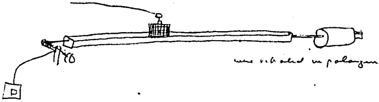
Also propose to vibrate a point immersed in a polarizing solution insulated except at Extreme End.



Spkg through a slot



steel band vibrated within a Coil give induced currents.



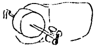
wire vibrated in polarizing liquid

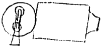
Spkg Telegraph

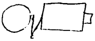
June 24 1877
T A Edison
Chas Batchelor
James Adams

Xpery

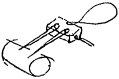
Theory I have found that contacts at high speeds offer a resistance in proportion to the pressure I propose to rotate a smooth platinized wheel in front of a diaphragm with great speed by an Electric Engine or other motor and platinize the diaphragm hence the louder you talk the stronger the pressure & you get articulation,



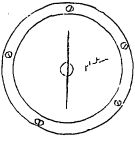




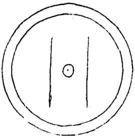
a spring might be used

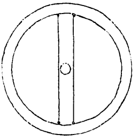


EDISON'S EXHIBIT. 180-11.



50^c each
Diaphram for Teleph
June 24 1877
T A Edison
Chas Batchelor
James Adams



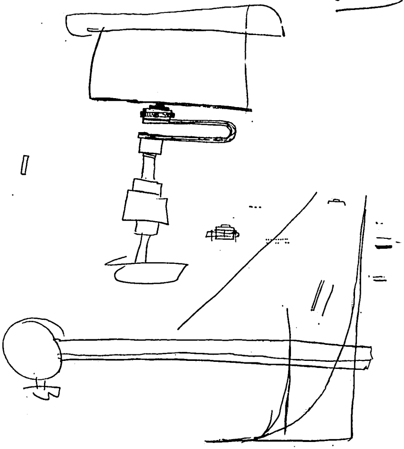


EDISON'S EXHIBIT. 181–11.

253

Spkg Telegraph

June 25 1877
TA Edison

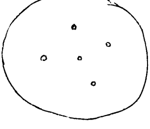


EDISON'S EXHIBIT. 182-11.

Spkg Telegh

June 25 1877
T A Edison

Diaphrams probably vibrate in part & have nodes I am going to try experiment of several flexible contact points on a diaphram



James Adams

Chas Batchelor

I find that although plumbago & the Conducting Oxides & other Compounds which conduct are good ~~Ex found~~ Lead & other metals & metaloids ~~with a~~ ~~wh~~ whose surface make bad contact will act to give vibration of variable strength & also the solid amalgam

EDISON'S EXHIBIT. 183-11.

June 25 77

68 4 Plumbago $\frac{250}{MG}$ Bisulphuret Tin

Articulation 129 no buckling. Edison

Tit a little roughed

---

39 4 Plumbago $\frac{750}{MG}$ Iodine

Articulation 125 no buckling Adams

Tit clean

---

57 15 Plumbago 8 Carb Magnesia

could not get enough sound to pass an opinion on

No 17 4 Plumbago $\frac{250}{MG}$ Sulphate Baryta

Articulation 125 — no newspaper talk. Tit clean

---

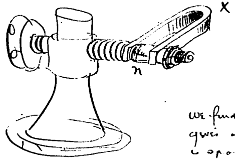
53 15 Plumbago 1 Soapstone —

Articulation 120

Could not get reading

258 Speaking Telegraph

June 25th 1877



Edison
Chas Batchelor
James Adams

We find X acts like a tuning fork gives after vibrations when a word is spoken also its own tone after a word is spoken & during the spkg of a word The rubber n is needed to prevent it

Edisons Exhibit 184-11
L.L.G.

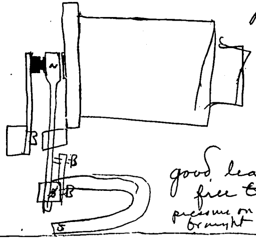
We just moulded some black oxide of Copper but find it aint a Conductor

EDISON'S EXHIBIT. 184-11

EDISON'S EXHIBIT. 185-11.

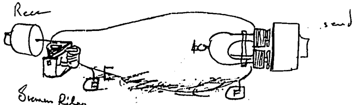
Spkg Teleph =

June 25. 1877
T. A. Edison
Chas Batchelor
James Adams



good leaves diaphragm free to move the pressure on plumbago being brought about by magnetism

Improvt on Bell Principle



Siemens Relay + parchment diaphragm

260

No 54 4 Plumbago 1 Phosphate of Iron Jan 25-77
Articulation good but could get ~~nothing~~ anything
when reading from a paper. 125 Jas Adams

Note Hereafter we are going to test all for
articulation by reading an article from
Daily paper and if after the article is
finished we get the sense of it we shall
know how good our articulation is

55 15 Plumbago 3 Carb Magnesia
Articulation 125 No Buckles
Tits clean

150 15 Plumbago. 11 Rubber.
Articulation 129 no buckling
Constant. Tit clean

143 15 Plumbag 2 Rubber
Articulation 129½ good excellent
Could not get all Tit clean

EDISON'S EXHIBIT. 187-11.

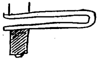
Speaking Telegraph   June 25th 1877
Edison
Test of Compositions continued.   Chas Batchelor
No -   James Adams
23   4 Plumbago. 1 $\frac{500}{HG}$ Bisulphuret Tin —

Articulation good 129½ very scratchy but excellent for all that. Tin clean
With the poles changed got the articulation low but a little better, and not scratchy

---

When starting these experiments today we replaced the receiver with the wooden sounding box one.

We now put on transmitter a springy holder like this for composition



40 4 Plumbago $\frac{600}{HG}$ Iodine
Very good indeed Articulation 129½

94 Retrying this with new spring we find it increased to 130 due either to spring or getting rid of bugs in wire

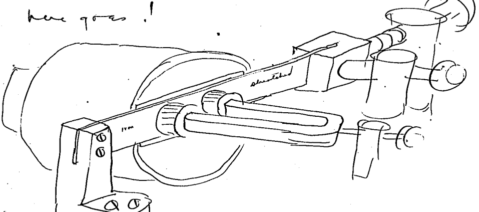
Spkg Telgh

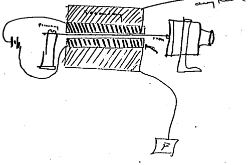
June 26 1877
TAE
Chas Batchelor

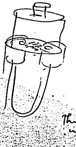
Could get it ordinary Conversation fair but not so good as ours, Reading out of a newspaper something strange & unknown Couldnt Catch a word in half Column whereas with our you could get the general tenor of every thing that is read =

James Adams

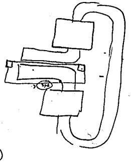
I propose to improve Bells as well as my own here goes!


iron
insulated


to distant Receiver any kind
Secondary
Primary
iron
F



Thin diaphragm with iron filing one of



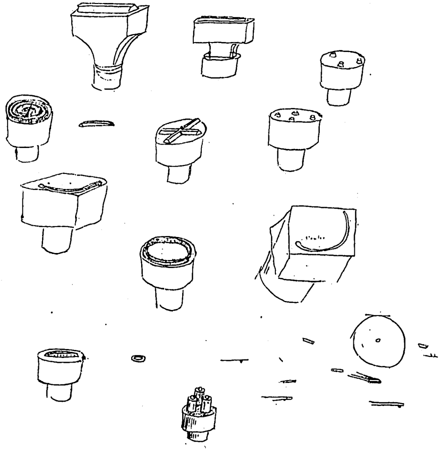
264

Speaking Telegraph

June 26 1877
T A Edison

we propose to make moulds to mould [illegible]
in the following shapes for speaking [illegible]

Chas Batchelor
James Adams

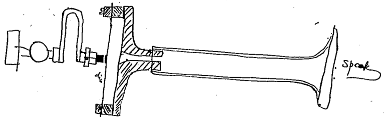


Speaking Telegraph

June 26 1877

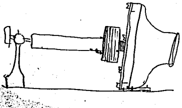
Thos A Edison
Chas Batchelor
James Adams

Colludion film for a diaphram = Mica for ditto



Having a small hole the amplitude of the vibration of the hissing Consonants are increased whereas the vowel etc sounds are decreased which improves the articulation -

Just finished a Bell Magneto Telephone -



1/16 iron diaphram resistance magnet 250 ohms 1 inch long fork permanent magnet about 7 inches length lifts about 2 lbs iron I find that diaphram dont seem to vibrate but the case diaphram & all does & it is this that does the work & I believe this is the way Bell is fooled by not securing his spkg devices rigidly =

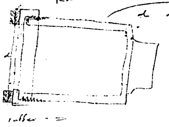
We carried on Conversation with the pair. it was so low I couldnt hear but Batch & Quin By pressing good

EDISON'S EXHIBIT. 191-11.

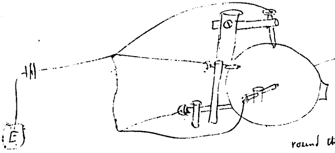
Speaking Telegraph

June 26 1877
T A Edison
Chas Batchelor
James Adams

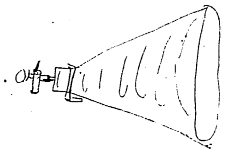
Soft rubber to allow diaphragm have more amplitude



Edisons Exhibit 191-11
S. L. G.



round thin foil Hemholtz resonator with plumbago points at various points =



this funnel ought to concentrate the air waves

EDISON'S EXHIBIT. 192–11.

Speaking Telegraph

June 26 1877
T A Edison
Chas Batchelor

We are going to mould Peroxide of Lead
also Peroxide of Lead on the End of a plumbago
stick = a mixture of a Lead & zinc
amalgam with plumbago =

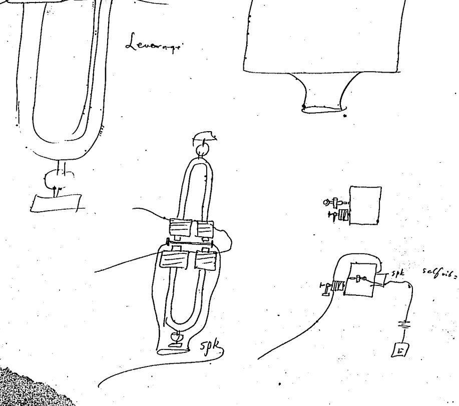
James Adams,

Things to be tried =

Platinum black =
Lead point =
Metallic points protoxidized =
Black finely divided Mercury
Fused Conducting Salts and
fused Chloride of Lead
Gutta percha mixed with various Conducting
Substances =

Spkg Telgh

Jy 26 1877
TAEd
Chas Batchelor
James Adams


Leverage
spk
spk
selfvib
E

Edison's Embossing Telegraph June 26th 1877

Chas Batchelor
James Adams

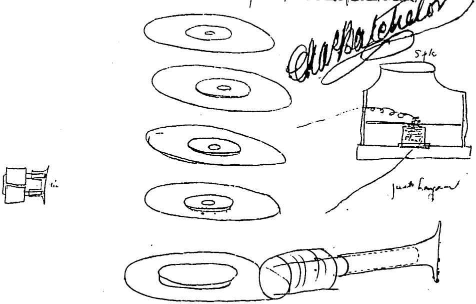
Edison noticed a serious Error in Embossers at Murrays today ~~& that~~ is ~~that~~ the repeating point following close behind the embossing point and being in the same straight line from centre of swing lever will not follow ~~in the~~ exactly the marks made by embossing point. This we remedied by making the two points only $\frac{1}{16}$ of an inch apart thus decreasing the error so as to make it hardly perceptible.

Speaking Telegraph

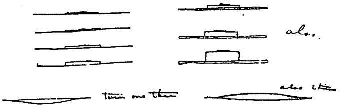
June 27 1877
T A Edison
James Adams

I find that weighting the centre of the diaphram gives better articulation therefore Batch is making 4 diaphrams

Chas Batchelor


5 pk
just Lagrand

of the same brass & weighting the centre by soldering different thicknesses of brass

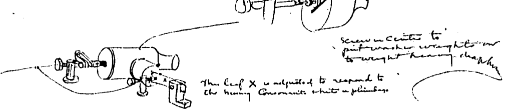

also.
turn one thin
also 2 thin

EDISON'S EXHIBIT. 196-11.

Speaking Telegraph.

June 27. 1877

T A Edison
Chas Batchelor
James Adams

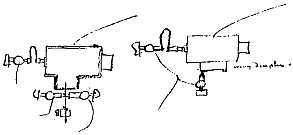


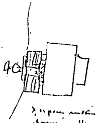
Screw in Centre to put washer weights on to weight heavy chap

The leaf X is adjusted to respond to the hissing Consonants which is plumbago

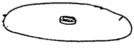
Connection may be made in various ways.

Edisons Exhibit 196-11
LLG.





Sponge rubber which serves to dampen the diaphragm increasing the working articulation better by (dampening harmonics).



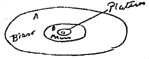
thin sardine tin box copper foil weighted glued to the hissing Consonants

271

Speaking Telegraph June 27. 1877

Edison
Chas Batchelor
James Adams

We now made 4 Draphragms of 52 Jewellers brass each being weighted but all different weights thus



A. Draphragm
B Weight 3/4 diameter
C Platina

No 1 Weighted with No 52 Brass
2 " " 38 "
3 " " 20 "
4 " . Br 16 "

We first put in the thickest diaphragm & No 66 " Plumbago & $\frac{250}{MG}$ Lycopodium

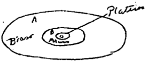
EDISON'S EXHIBIT. 197–11.

2713

Speaking Telegraph June 27. 1877

Edison
Chas Batchelor
James Adams

We now made 4 Diaphragms of 52 Jewellers brass each being weighted but all different weights thus



A Diaphragm
B Weight 3/4 diameter
C Platina

No 1 Weighted with No 52 Brass
2 " " 38 "
3 " " 20 "
4 " " No 16 "

We first put in the thickest diaphragm
&
No 66 4 Plumbago & $\frac{250}{MG}$ Lycopodium

EDISON'S EXHIBIT. 198–11.

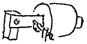
274

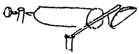
June 27 1877

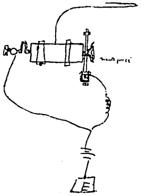
Edison

Chas Batchelor

James Adams






Line
mouth piece
E

having Consonant vibrator in front of regular vibrator talker.

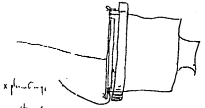
EDISON'S EXHIBIT. 199–11.

27.

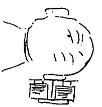
Speaking Telegraph

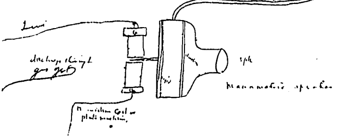
June 27 1877

T A Edison
Chas Batchelor
James Adams

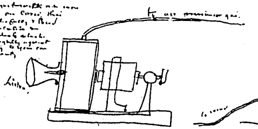


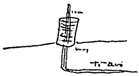
thick diaphragm loose & hitting plumbago

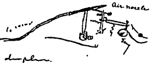



to gas pipe
Line
discharge through gas Jet
sph
Manometric speaker
To induction Coil or plate machine

Electromagnet with an iron cheek [illegible] on Cover [illegible] [illegible] & Bend [illegible] [illegible] you press [illegible] to hold slightly against [illegible] spring [illegible] [illegible] [illegible]


to air pressure gas
Listen




to [illegible]
Air nozzle

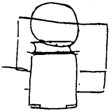
rubber metal or other diaphragm

Wind Receiver

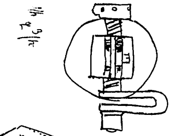
The Electromotograph may replace the Magnet

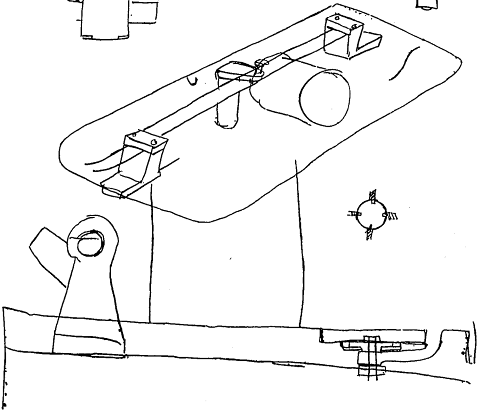
275

Speaking Telegraph
June 29th 1877



Adams



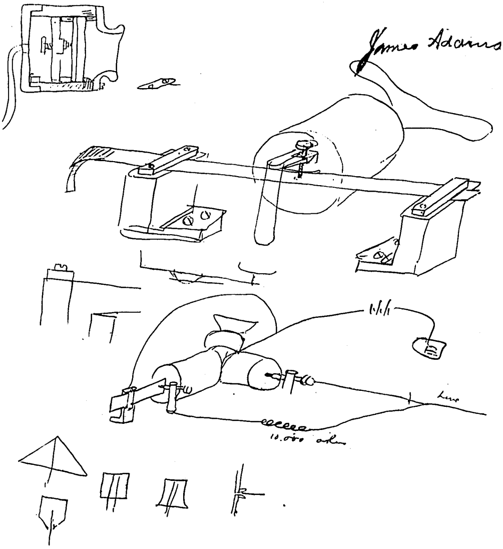


EDISON'S EXHIBIT. 201–11.

Speaking Telegraph

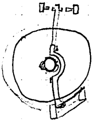
June 29 1877
T A Edison

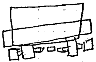
James Adams


line
10.000 ohms

May 30th Telephon with 3 transmitters
80 hours

June 3
Talker cast Iron transmitter
36 ~~46~~ do





June 5 1875 $7\frac{00}{100}$ No 32

May 24th	Started at 11 a.m	H.10
" 25		15
26		10
27		10
28		14
29		21
		80

May 31	Talking	Telegraph	10 hours
June 1	"	"	13
" 2	"	"	10
" 3			3
			36

Allowing Automatic Relay $\$2\frac{00}{100}$

No 33

See 171/11

May 19 Electromotograph for Sextuplex $18\frac{00}{100}$

No 28

May 23 Electromotograph for Telephone $15\frac{00}{100}$

No. 29

June 18th Single Spool Relay for Sextuplex

$5\frac{00}{100}$

No 34

Speaking telegraph model for Murray transmitter & Receiver

No 35

June 8th	hours 8
" 9	" 9
" 10	" 12
" 11	" 14
" 12	" 17
" 13	5
" 14	15
" 15	15
" 16	9
" 18	14
	118

June 21 No 36.

fixing Chesel for tin foil glass on Electrical Pen

$\$2.\frac{50}{100}$

June 22 Electric Pen for Music No 37

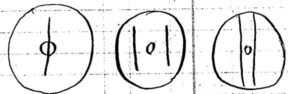
$\$3\frac{00}{100}$

June 22 Front Points for Double Relay No 38

75c

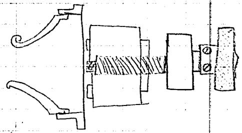
June 24th Diaphrams for Talker No 39

50¢

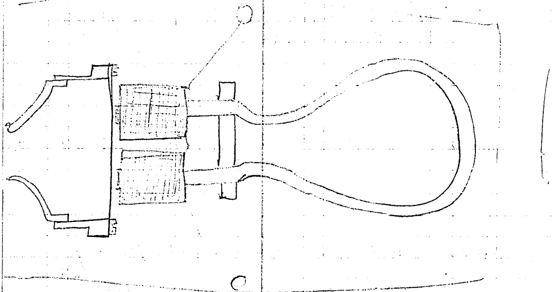


June 30th No. 40

Brit see 17/11



Bell Telephone with magnets $10.00



2 Bell Telephones No 41 $10 Each
June 30th